INTERNATIONAL CONFERENCE | BUSAN, KOREA

KJF-ICOMEP 2026

KJF International Conference on Organic Materials for Electronics and Photonics

Date
Aug 25 - 28, 2026

Venue
Hanwha Resorts Haeundae, Busan

Organized / Co-organized by

- **The Polymer Society of Korea**
- **Ewha Womans University** – New and Renewable Energy Research Center
- **Pusan National University** – Sustainable Utilization of Photovoltaic Energy Research Center
- **Chung-Ang University** – BK21 Chemical Engineering Education & Research Team
- **Chungnam National University** – BK21 Education and Research Group for Convergent Chemical Materials in the 4th Industrial Revolution Era
- **Gyeongsang National University** – G-LAMP, Research Institute of Molecular Alchemy
- **Jeonbuk National University** – Graduate School of Flexible & Printable Electronics
- **Pohang University of Science and Technology** – Polymer Research Institute
- **Pukyong National University** – Center for Energy Conversion/Storage Utilization System
- **Yonsei University** – BK21 Graduate Education Program for World-Class Chemical Engineers with Social Consciousness
- **Ewha Womans University** – Institute for Multiscale Matter and Systems
- **Chung-Ang University** – Institute of Energy-Conversion Soft Materials
- **Korea Research Institute of Chemical Technology**

Sponsored by

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- Blue Chem Materials
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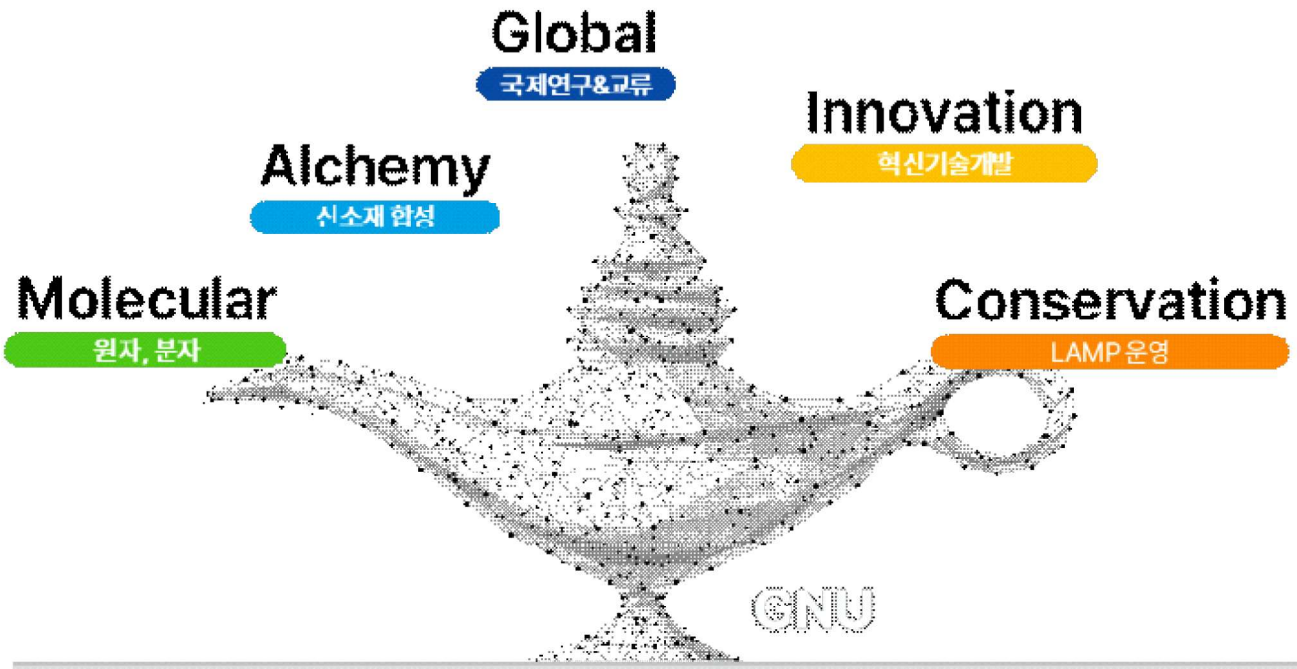
한국고분자학회 The Polymer Society of Korea

KJF-ICOMEP 2026
Aug. 25(Tue) ~ Aug. 28(Fri), 2026 · Busan, Korea

부산관광공사 BUSAN TOURISM ORGANIZATION

경상국립대학교 G-LAMP 사업단



GNU G-LAMP

Molecular Alchemy Global Innovation and Conservation

MAGIC LAMP

Leading the development of future new materials and fostering excellent talent to establish our position as a materials-centric hub and secure global competitiveness

선도연구센터(ERC)후속연구

태양광 에너지 지속가능 활용 연구센터

Sustainable Utilization of Photovoltaic Energy Research Center

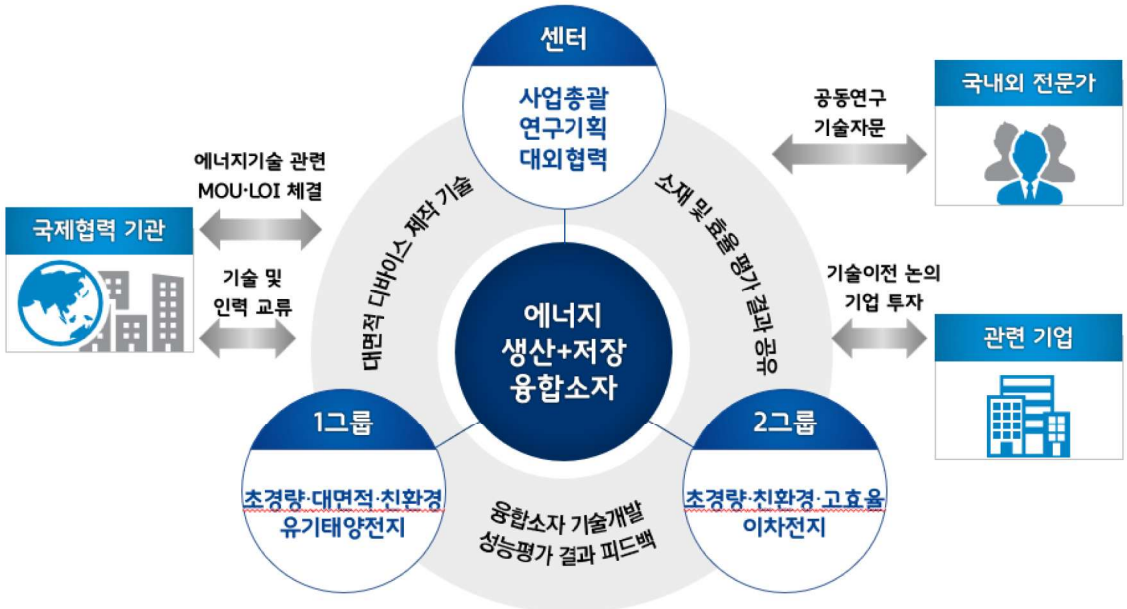
과학기술정보통신부 Ministry of Science and ICT
선도연구센터 (ERC) Engineering Research Center
태양광 에너지 지속가능 활용 연구센터 Sustainable Utilization of Photovoltaic Energy Research Center
부산광역시 부산대학교 NRF 한국연구재단

과제명	태양광 에너지 지속가능 활용 연구센터
주관기관	부산대학교
공동기관	경희대학교, 대구경북과학기술원, 서울시립대학교, 신라대학교, 울산과학기술원, 한국과학기술원, 한양대학교
총연구기간	2025.03. ~ 2028.02. (후속 : 36개월)
센터장	진성호 교수
참여인력	핵심연구원(교수급): 13명/연구원: 4명/학생연구원: 101명

연구센터의 최종 목표 및 전략

독립적인 태양광 지속가능 활용시스템 구축

후속 연구 추진체계



- 재생에너지 중심의 에너지 정책 확대
- 지속적인 R&D 지원 필요
- 일자리 창출 및 우수 연구자 양성
- 글로벌 R&D 협력체계 질적 혁신성과 달성
- 산학협력의 거점 역할, 사업화 달성

(46241)부산광역시 금정구 부산대학로63번길 2 (장전동) TEL: 051-510-1755 FAX : 051-581-2348 http://super-erc.pusan.ac.kr

NRF 한국연구재단 | 국립부경대학교 PUKYONG NATIONAL UNIVERSITY | 부산광역시 BUSAN METROPOLITAN CITY

국립부경대학교 이공분야 중점연구소

에너지 융복합 소재연구소 (CECS)

엑시톤 제어를 통한 에너지 변환 / 저장 활용 시스템 개발

연구소장

고분자공학전공
김주현

공동연구원

에너지화학
소재공학전공
장재원

물리학과
박성흠

화학과
김현성

금속공학전공
고민성

신소재시스템
공학전공
김정환

"연구 성과가 사회적 가치로 확장되는 연구소"

MISSION

국가 및 지역 첨단 에너지 변환/저장 소재 산업 발전을 위한 기반 구축 및 글로벌 경쟁력 확보

VISION

첨단 R&D 플랫폼을 구축하여 연구개발-인력양성-기술지원-사업화 지원 시스템이 구축된 연구소로 발전(지역 및 글로벌 협력체계 구축)

엑시톤을 제어할 수 있는 기술을 확립하고 이를 통한 미래 소재 및 소자 구현

소재개발팀 (김주현, 장재원, 김현성)
엑시톤 기반 에너지 변환 /저장 활성 소재 개발

물성분석팀 (박성흠, 김정환)
엑시톤 기반 양자 물성 연구

소자응용팀 (고민성, 김정환)
에너지 변환 및 저장 소재 /소자 고성능 구현 연구

국내외기관
한국공업화학회, 한국재료연구원, 싱가포르 NTU 등

- 2단계 연구 성과 현황(25.03 ~26.07 기준) -

- **SCI 논문: 46편** (JCR 10% 이내 14편, JCR 25% 이내 23편)
- **특허: 출원 6건, 등록 4건** (국내 출원 5건 / 국내 등록 3건 / PCT 출원 1건 / 미국 등록 1건)
- **학술대회 개최: 6건**
- **기술자문: 5건**
  기술이전: 2건

IMMS

INSTITUTE FOR MULTISCALE MATTER AND SYSTEMS

멀티스케일 물질 및 시스템 연구소

- 주관연구기관: 이화여자대학교
- 연구책임자: 문회리 교수
- 주소: 서울 서대문구 이화여대길 52, 이화여자대학교
- 홈페이지: https://imms.ewha.ac.kr

MISSION

멀티스케일 융합 연구를 통해
혁신적 물질과 시스템 기술을 창출하고
인류의 지속가능한 미래에 기여한다.

VISION

세계 최고 수준의 연구 역량과
개방·협력 생태계를 기반으로
글로벌 K-허브로서 미래 과학기술 혁신을 선도한다.

5개 기술그룹(TG)이 유기적으로 연계되어, 4대 핵심과제(CP)를 통해 미래 기술의 실질적 구현에 도전합니다

TG : Technical Group　　CP : Core Project

TG1 Frontier Materials
미래를 여는
혁신 소재 설계·합성

TG2 Multiscale Computation
멀티스케일 계산으로
이해·예측

TG3 Multiscale Characterization
원자부터 시스템까지
정밀 분석

TG4 Frontier Device Solutions
소자 시스템 구현으로
성능 극대화

TG5 Scalable Self-Driving Lab
자율실험실로
연구 가속 및 확장

CONNECT · INTEGRATE · REALIZE

IMMS TG–CP Framework

4대 핵심 추진과제(CP)

연결이 혁신을 만들고, 융합이 미래를 이끈다

차세대 연구자와 함께
미래 연구 생태계를 만들어갑니다.

융합과 혁신
다양한 전문성의 연결을 통해
새로운 지식과 기술을 창출합니다.

AI·자율화
AI와 자율실험실로
연구의 속도와 효율을 혁신합니다.

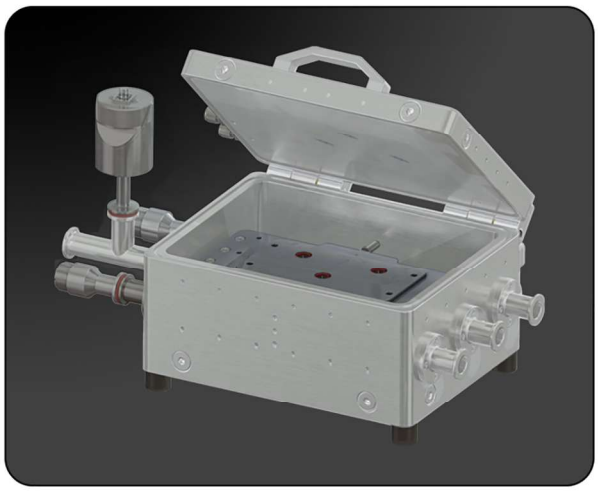
개발·협력·글로벌
개방형 생태계와 글로벌 협력으로
K-과학기술의 미래를 선도합니다.

이화여자대학교 EWHA WOMANS UNIVERSITY
국가 NRL 2.0 연구소
e600315@ewha.ac.kr

Next-Generation Deposition & Analysis

From Deposition to Intelligence

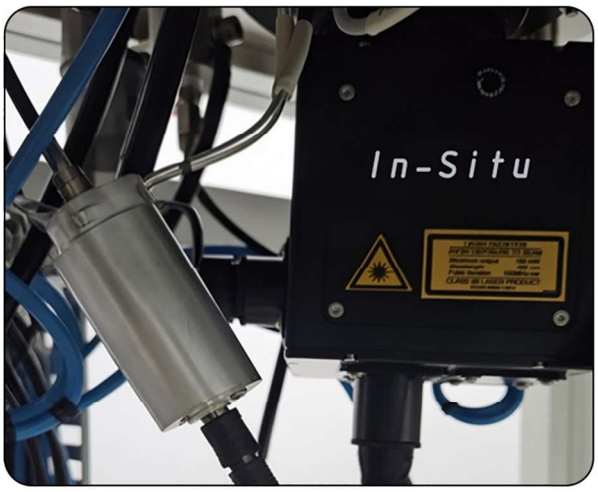
Build · Monitor · Optimize



CSS Deposition System

Glovebox-Integrated close-spaced sublimation platform

- **Controlled atmosphere deposition** for sensitive materials
- **High Material Utilization** with rapid thin-film formation via CSS
- **Adjustable source–substrate gap** for process optimization
- **Exceptional Thermal Uniformity** via independent source/substrate control
- **Substrate size: up to 100 × 100 mm**
- **Glovebox-compatible vacuum system**



In-situ PL / AI

Real-time Process Intelligence

- **Real-time Quality Control**
  Monitors film uniformity and defect evolution during deposition
- **Composition & Bandgap Tracking**
  Tracks composition and bandgap evolution via *in-situ* PL
- **Efficiency Prediction**
  AI-driven analysis correlates PL signals with device performance
- **Closed-Loop Process Optimization**
  Enables AI-assisted process control for enhanced reproducibility

(주)고려기연

Toward Your Mission · Total Solution Provider

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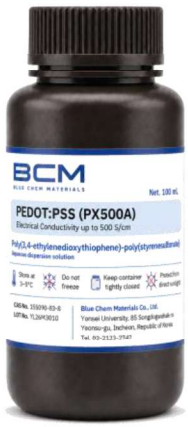
BCM
BLUE CHEM MATERIALS

PEDOT:PSS · PX SERIES

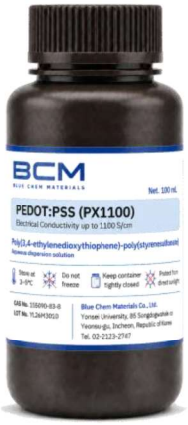
Beyond the Limits of Conductivity, We Engineer New Possibilities with PEDOT:PSS.

From high conductivity and adhesion to solvent-reduced processing, BCM designs and supplies conductive polymer materials tailored to each customer's application environment.

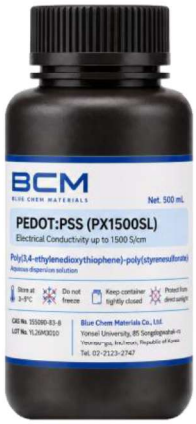
FLAGSHIP MATERIALS



PX500A



PX1100



PX1500SL

Find the Right PX Series by Function

CONDUCTIVITY
High-conductivity solutions

PX1100
Up to 1,100 S/cm

PX1500SL
High electrical conductivity

ADHESION
Adhesion-control solutions

PX500A
Adjustable adhesion & conductivity

PX500WF
Adhesion control

PROCESS
Process innovation

PX1300SF
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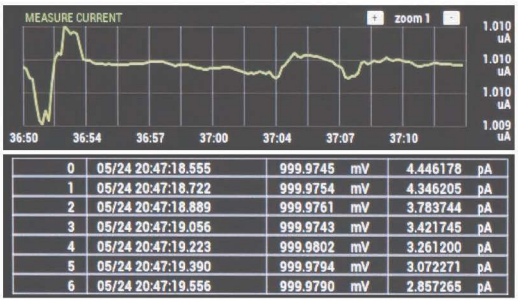
OLED & Display | **Solar Cell** & Photovoltaics | **Battery** & Electrochemical System | **Flexible Electronics** & Organic Semiconductor | **LED** & Optical System

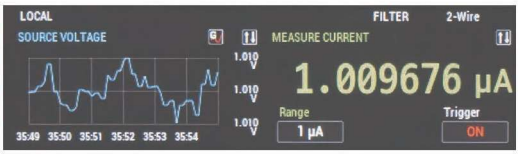
Crucial Experiments with McScience

MOTiV 520 IV Analyzer

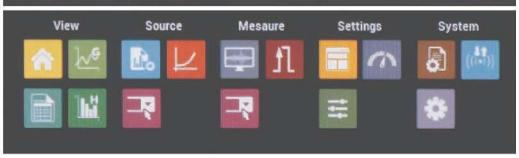
- Voltage Source Current Measure (VSCM)
- Current Source Voltage Measure (CSVM)
- 4-Quadrant Operation
- I-V Characteristics
- AUX ZRA Channel

The 520 IV Analyzer is a general-purpose source meter capable of sourcing voltage(current) and measuring current(voltage) with 4-quadrant operation for simultaneous real-time sourcing, sinking, and measurement. Its multi-range architecture and automatic compliance protection enable stable I-V characterization of advanced electronic devices and materials, while the built-in photocurrent measurement channel supports optical measurements during electrical testing.





0	05/24 20:47:18.555	999.9745	mV	4.446178	pA
1	05/24 20:47:18.722	999.9754	mV	4.346205	pA
2	05/24 20:47:18.889	999.9761	mV	3.783744	pA
3	05/24 20:47:19.056	999.9743	mV	3.421745	pA
4	05/24 20:47:19.223	999.9802	mV	3.261200	pA
5	05/24 20:47:19.390	999.9794	mV	3.072271	pA
6	05/24 20:47:19.556	999.9790	mV	2.857265	pA



DeJign S820 ProbeStation

- Solar Cell / OLED / TFT Devices
- Micro-Electrode Sample JIG
- Vacuum Holding System
- Stable Contact / High Repeatability

The S820 ProbeStation measures the stable electrical characteristics of various devices, including solar cells, OLEDs, and TFTs. By utilizing a Micro-Electrode Sample JIG and a Vacuum Holding System, it securely fixes samples and supports reliable probe contact, providing a consistent measurement environment even during repeated measurements.

경기도 수원시 영통구 덕영대로 1556번길 16 디지털엠파이어 B동 1102호
Tel : 031-206-8009 | Fax : 031-206-8007 | Email : sales@mcscience.com

McScience
www.mcscience.com

K SOL Corp.
KSOL 케이솔
The K to open the measurement world

Comprehensive Measuring Instrument Company
(종합 계측기기 전문기업)

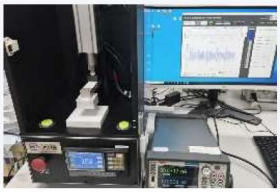
KSOL, established in 2023, is a comprehensive measurement instrument specialist company that, based on supplying electronic measuring instruments and electronic equipment, develops and provides customized measurement systems and tailored characterization analysis programs optimized for customers' research purposes. Based on cooperation with global metrology brands such as KEITHLEY, Keysight, Tektronix, HIOKI, and SRS, in the semiconductor and new materials research.

KEITHLEY	KEYSIGHT	Tektronix	HIOKI	SRS

(글로벌 브랜드와의 협력을 통해 맞춤형 측정 시스템과 특성분석 프로그램을 개발, 공급합니다)

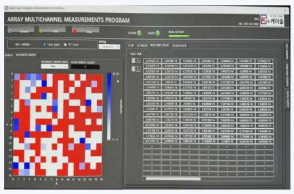
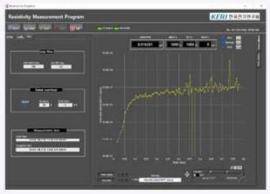
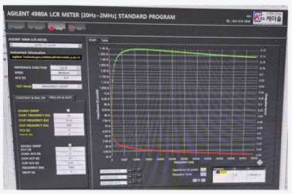
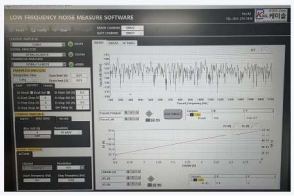
01 Characterization Solutions *(특성분석 솔루션)*

- Device IV & FET Characterization Solution by Wavelength
- Pushing Machine & Bending Machine Solution
- Multi-channel Array Characterization Solution




02 Customized Programs *(맞춤형 프로그램)*

- Arbitrary Pulse Sourcing Program by SMU's
- Resistivity / Low Current Measurement Curve
- Sheet & Volume Resistance Curve
- IV & FET Curve / CV Curve
- Low Frequency Noise (LFN)

03 Measurement Instruments *(계측기기)*

- Semiconductor Characteristics System
- Source Measure Units (SMU)
- Precision LCR Meter
- Function & Pulse Generator
- Oscilloscope
- Multi-meter





The K to open the measurement world

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HI-TEK INTERNATIONAL INC.

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仕事関数・イオン化ポテンシャル測定
일 함수 및 이온화 포텐셜 측정
The Work function and Ionization measurements

大気中光電子収量分光装置
대기중 광전자 수량분광장비
Photoemission Yield Spectroscopy in Air

有機EL討論会
유기EL토론회
Japan OLED Forum
第16回貢献賞受賞

Model : **AC-2S / AC-2S Proα / AC-2S Proβ**

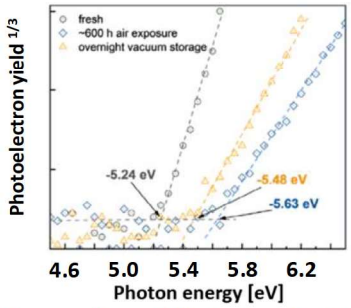
【主な活用分野/활용 분야/Application】

ペロブスカイト太陽電池材料/페로브스카이트 태양전지/perovskite solar cell、有機EL/유기 EL/OLED、
有機太陽電池/유기 태양전지/organic solar cell、有機トランジスタ/유기 트랜지스터/organic transistor
燃料電池/연료전지/Fuel cell、全固体電池/전고체전지/solid-state Battery、 LIB

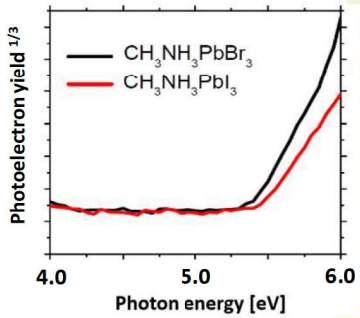
For more technical information,
please scan the QR code to visit our website.
https://product.rikenkeiki.co.jp/english/ac/

【活用例/활용예/Usage example】

ペロブスカイト太陽電池材料/페로브스카이트 태양전지/perovskite solar cell

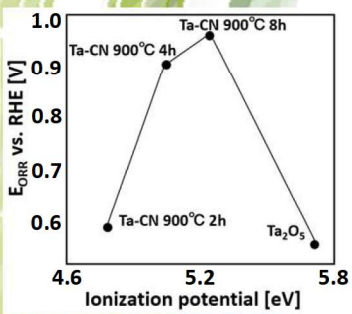


Badamgarav Purev-Ochir, Xuelong Liu, Yuki Fujita, Dai Semba, Telugu Bhim Raju,Ganbaatar Tumen-Ulzii, Atsushi Wachi, Hiroshi Sato, Toshinori Matsushima,and Chihaya Adachi
Sol.RRL (2023), DOI: 10.1002/solr.202300127



Akihiro Kojima, Kenjiro Teshima , Yasuo Shirai and Tsutomu Miyasaka , J. Am. Chem. Soc., 2009 , 131 (17), pp 6050-6051

燃料電池/연료전지/Fuel cell



A. Ishihara, M. Tamura, K. Matsuzawa, S. Mitsushima, K. Ota, Electrochimica Acta, 55(2010), 7581-7589

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KJF-ICOMEP 2026

KJF International Conference on Organic Materials for Electronics and Photonics

August 25 – August 28, 2026

Hanwha Resorts Haeundae, Busan, Korea

Organized by

The Polymer Society of Korea

Conference Scope

- Transistors and Memory Devices
- Photovoltaics and Photodiodes
- Energy Storage and Conversion Devices
- Nonlinear Optical Materials and Devices
- Electrochromic Materials and Devices
- OLED Materials and Devices
- Molecular Photonics
- Molecular Recognition
- Sensors and Bioelectronics
- Other Related Topics

Organizer & Co-organizers

- The Polymer Society of Korea (한국고분자학회)
- Ewha Womans University – New and Renewable Energy Research Center (이화여자대학교 신재생에너지연구센터)
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- Korea Research Institute of Chemical Technology (한국화학연구원)

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Greeting

On behalf of the conference committee and the international committee, we cordially invite you to 2026 KJF-International Conference on Organic Materials for Electronics and Photonics (KJF-ICOMEP 2026) held on August 25 ~ 28, 2026 at **Hanwha Resorts Haeundae, Busan, Korea.** The Korea-Japan Joint Forum (KJF) started with members of 30 in 1989. Now this forum is surprisingly expanded into an international conference that facilitates the coming together of scientists, engineers, and business leaders for the exchange of information about recent advances in organic materials for electronics and photonics. The topics of conference will cover from the basic studies such as material synthesis, fabrication and characterization of thin films, interfacial phenomena, spectroscopy, and single-molecule manipulations, to the application-oriented studies, including LEDs, FETs, memory devices, solar cells, batteries, biochips, and biosensors. We are fully confident that all participants from industry as well as academia will benefit a great deal from this opportunity of scientific exchange provided by KJF-ICOMEP2026. Especially, the participation of young and motivated researchers is highly encouraged.

We hope that this conference will be fruitful to you in acquiring the cutting-edge knowledge, and also that you enjoy experiencing the fascinating culture and warm hospitality of Busan in Korea.

We look forward to meeting you in beautiful Busan on August 25 ~ 28, 2026.

Prof. Kyungkon Kim

Conference Chair of KJF-ICOMEP2026

History

Year	KJF	Place (City)	Participants (Korea/Japan/Others)	Papers
1989	KJF'89	KIST (Seoul)	10/20	20
1990	KJF'90	RIKEN (Wako)	15/30	20
1991	KJF'91	KIST (Seoul)	40/15	20
1992	KJF'92	RIKEN (Wako)	25/50	42
1993	KJF'93	KRICT (Daejeon)	70/25	60
1994	KJF'94	NIMC (Tsukuba)	40/60	80
1995	KJF'95	Korea University (Seoul)	120/30	85
1996	KJF'96	AIST (Tsukuba)	40/120	150
1997	KJF'97	K-JIST (Gwangju)	140/4	117
1998	KJF'98	Hokkaido University (Sapporo)	48/63	89
1999	KJF'99	Gyeongju TEMF Hotel (Gyeongju)	126/44	170
2000	KJF2000	Kyoto Research Park (Kyoto)	72/80	126
2001	KJF2001	Seoul National University (Seoul)	173/46	159
2002	KJF2002	TG Hall (Sendai)	92/197	174
2003	KJF2003	Pusan National University (Pusan)	200/45	220
2004	KJF2004	Okinawaken Seinenkaikan (Naha)	150/70	220
2005	KJF2005	Yousung Hotel (Daejeon)	180/70	212
2006	KJF2006	Toki Messe (Niigata)	128/146	217
2007	KJF2007	Korea University (Seoul)	232/69	243
2008	KJF2008	CIST (Chitose)	140/190	247
2009	KJF2009	Jeju KAL Hotel (Jeju)	313/80/10	283
2010	KJF2010	Kitakyushu International Conference Center (Kitakyushu)	159/168/7	256
2011	KJF2011	Hyundai international Hotel (Gyeongju)	248/101/8	301
2012	KJF2012	Tohoku University (Sendai)	76/180/6	201
2013	KJF2013	Haeundae Grand Hotel (Busan)	370/92/10	387
2014	KJF2014	Tsukuba International Congress Center (Tsukuba)	94/193/6	286
2015	KJF2015	Jeju KAL Hotel (Jeju)	246/94/11	277
2016	KJF2016	ACROS Fukuoka (Fukuoka)	128/232/10	310
2017	KJF2017	GIST (Gwangju)	205/64/8	244
2018	KJF2018	Nagaragawa Convention Center (Gifu)	138/114/4	225
2019	KJF2019	Jeju Maison Glad Hotel (Jeju)	252/53/8	251
2021	KJF2021	Online (Yokohama)	88/105/2	189
2022	KJF2022	Jeju KAL Hotel (Jeju)	241/35/0	217
2023	KJF2023	Centennial Hall, Kyushu University School of Medicine (Fukuoka)	117/125/3	196
2024	KJF2024	Hotel Nongshim (Busan)	199/73/5	203
2025	KJF2025	Osaka International Convention Center (Osaka)	92/212/7	236
2026	KJF2026	Hanwha Resorts Haeundae (Busan)	204/75/5 (As of Aug.11)	219

Organizing Committee

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Chair of Local Committee	Prof. Joo Hyun Kim (Pukyong Nat'l Univ., Korea)
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Plenary & Invited Speakers for KJF-ICOMEP 2026

Plenary speakers	Prof. Taek Seung Lee (Chungnam National University, Korea) Prof. Jun Takeya (Univ. of Tokyo, Japan)
Invited speakers	Prof. Jaewon Chang (Pukyong National University, Korea) Prof. Takayuki Chiba (Yamagata University, Japan) Prof. Shinuk Cho (University of Ulsan, Korea) Prof. Dae Sung Chung (Pohang University of Science and Technology, Korea) Dr. Anthony D'Aléo (Institut de Physique et Chimie des Matériaux de Strasbourg, CNRS, France) Prof. Xugang Guo (Southern University of Science and Technology, China) Prof. Jinsoo Joo (Korea University, Korea) Prof. Dongwook Kim (Kyonggi University, Korea) Prof. Kyung Jin Lee (Chungnam National University, Korea) Prof. Cheng-Liang Liu (National Taiwan University, Taiwan) Prof. Yutaka Majima (Institute of Science Tokyo, Japan) Prof. Rie Makiura (Tohoku University, Japan) Prof. Jin-Woo Oh (Pusan National University, Korea) Prof. So-Jung Park (Ewha Womans University, Korea) Prof. Akinori Saeki (The University of Osaka, Japan) Prof. Dong-Myeong Shin (The University of Hong Kong, Hong Kong, China) Prof. Sung Yun Son (Kwangwoon University, Korea) Dr. Keisuke Tajima (RIKEN Center for Emergent Matter Science, Japan) Prof. Shree Prakash Tiwari (Indian Institute of Technology Jodhpur, India) Prof. Han Young Woo (Korea University, Korea) Prof. Yumi Yakiyama (The University of Osaka, Japan) Prof. Hiroko Yamada (Kyoto University, Japan) Prof. Hiroyuki Yoshida (Chiba University, Japan)

Abstract Book

- Program book with full abstracts for KJF-ICOMEP 2026 can be downloaded from the following link.

https://www.kjf-icomep.org/kjf/down/KJF2026_Program-Abstract.pdf

Registration

- All attendees are required to register and pay the appropriate registration fee in order to participate in any capacity at the Meeting. Full-regular registration includes access to the plenary & invited lectures, oral sessions, poster sessions, welcome reception, exhibition and banquet.
- Due to limited capacity, complimentary banquet admission for Regular Participants will be available on a first-come, first-served basis at registration.
- Student Banquet are included once on August 26 (Wed).
- KJF-ICOMEP 2026 participants are advised to register in advance by July 31, 2026 to get the early registration discount. Registration fee includes conference abstract book, welcome reception, and banquet.

Registration Fee	Until July 31	After July 31
Regular (International)	340 USD (~53,000 JPY)	370 USD (~58,000 JPY)
Regular (Korean)	500,000 KRW	550,000 KRW
Student (International)	170 USD (~26,500 JPY)	200 USD (~31,500 JPY)
Student (Korean)	250,000 KRW	300,000 KRW

*Note: Transactions will be made in USD for credit cards issued outside of Korea.

Payment Method

- Credit cards - VISA, MASTER, JCB, AMEX, UnionPay
- Bank Transfer (The bank transfer charges should be paid by the participant.)

Special Issue

Registrants will have a chance to submit a manuscript to a special issue for KJF-ICOMEP 2026 in *Molecular Crystals and Liquid Crystals* (a SCI indexed journal) published by Taylor & Francis. The submitted manuscript will be reviewed by the guest editors and two or more anonymous experts, following the journal standard procedure.

Please note that you need to:

- Specify the KJF Registration No. and the corresponding author in the cover letter, and
- Select the special issue **"KJF-ICOMEP 2026."**

Submission deadline: September 20, 2026

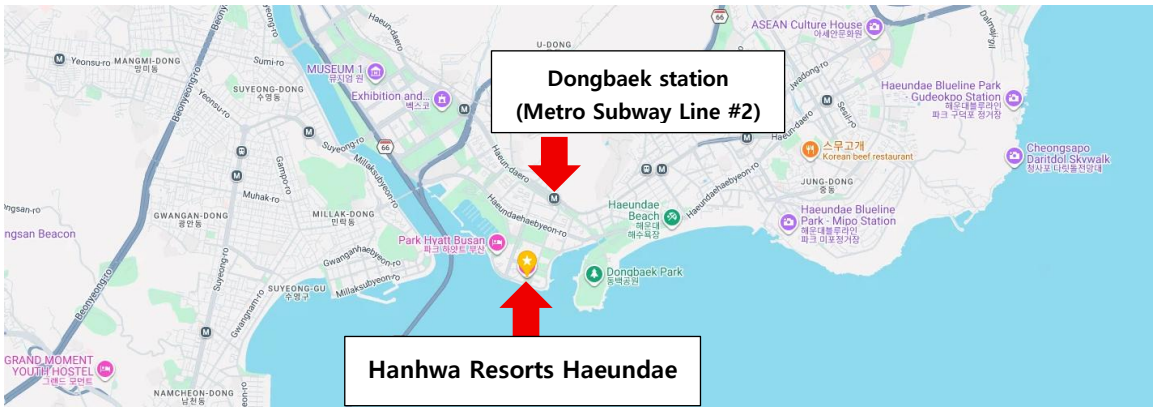
Journal Information: https://www.tandfonline.com/journals/gmcl20

Submission: https://rp.tandfonline.com/submission/create?journalCode=GMCL

Venue

- **Hanwha Resorts Haeundae (Busan, Korea)**

Address	52 Marine city 3-ro, Haeundae-gu, Busan
Phone	+82-51-749-5500
Session	**B1 Floor (Monterosso Hall)**
Poster	**3rd Floor (Vernazza Hall)**
Dining	**2nd Floor**



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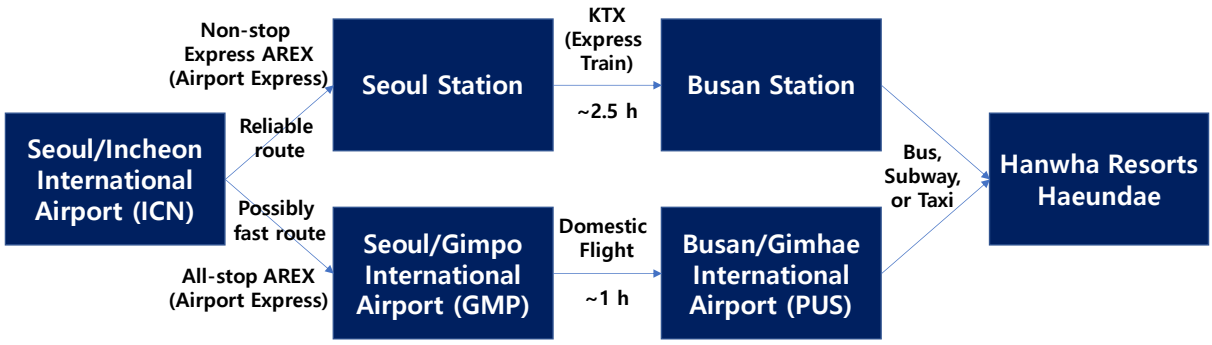

From Busan Station (KTX Extress Train)

- [Bus] Take Bus #1003 to Daewoo Marina Apartment, then walk to Hanwha Resorts Haeundae (~1 hour, ~2 USD)
- [Subway] Take Metro Subway Line #1 to Seomyeon station → Transfer to Line #2 → Get off at Dongbaek station → Take Exit #1 and walk toward Marine City (~1 hour, ~2 USD)
- [Taxi] Taxi would take ~30–40 min depending on traffic. (~14 USD)

From Busan/Gimhae International Airport (PUS)

- [Bus] Take Airport Limousine Bus to Hanwha Resorts Haeundae (~1 hour 10 min, ~7 USD)
- [Subway] Take Busan/Gimhae Light Rail to Sasang station → Transfer to Metro Subway Line #2 → Get off at Dongbaek station → Take Exit #1 and walk (~1 hour 25 min, ~2 USD)
- [Taxi] Taxi would take ~40 min. (~20 USD)

Welcome Reception

- Tuesday, August 25 at 6:00 pm
- “Fingers & Chat”, The Bay 101 (1st Floor)

Banquet

- Wednesday, August 26 at 6:30 pm
- “Fish & Seaside Kitchen”, Hanwha Resorts Haeundae (2nd Floor)

Timetable

25 (Tue.) Aug		26 (Wed.) Aug			27 (Thu.) Aug			28 (Fri.) Aug		
Time	Session	Time	Session	Speaker	Time	Session	Speaker	Time	Session	Speaker
		08:40	Opening Ceremony (Prof. Kyungkon Kim)		08:40	IL-12 OLEDi	Anthony D'Aleo (IPCMS)	08:40	IL-19 TrMeD	Shree P. Tiwari (IIT-Jodhpur)
		08:45	PL-1 TrMeD	Jun Takeya (Univ. of Tokyo)	09:00	IL-13 OLEDi	Dongwook Kim (Kyonggi Univ.)	09:00	IL-20 ChmSyn	Rie Makiura (Tohoku Univ.)
		09:20	IL-01 TrMeD	Jinsoo Joo (Korea Univ.)	09:20	IL-14 OLEDi	Takayuki Chiba (Yamagata Univ.)	09:20	IL-21 EneSC	Dong-Myeong Shin (Univ. of Hong Kong)
		09:40	IL-02 ChmSyn	Xugang Guo (SUSTech)	09:40	IL-15 EneSC	Cheng-Liang Liu (Nat'l Taiwan Univ.)	09:40	GL-07 TrMeD	Tomoyuki Akutagawa (Tohoku Univ.)
		10:00	Session Break (20 min)		10:00	Session Break (20 min)		09:55	YS-01 MoSBE	Arti Singh (Pusan Nat'l Univ.)
		10:20	IL-03 PVPD	Keisuke Tajima (RIKEN)	10:20	IL-16 MoSBE	Dae Sung Chung (POSTECH)	10:05	Session Break (15 min)	
		10:40	IL-04 PVPD	Shinuk Cho (Ulsan Univ.)	10:40	IL-17 TrMeD	Hiroko Yamada (Kyoto Univ.)	10:20	IL-22 PVPD	Hiroyuki Yoshida (Chiba Univ.)
		11:00	IL-05 PVPD	Akinori Saeki (Univ. of Osaka)	11:00	IL-18 ChmSyn	Sung Yun Son (Kwangwoon Univ.)	10:40	IL-23 MoSBE	Jin-Woo Oh (Pusan Nat'l Univ.)
		11:20	IL-06 PVPD	Jaewon Chang (Pukyong Nat'l Univ.)	11:20	GL-05 TrMeD	Ryoma Hayakawa (NIMS)	11:00	GL-08 PVPD	Tsubasa Mikie (Hiroshima Univ.)
		11:40	GL-01 PVPD	Kodai Yamanaka (Hiroshima Univ.)	11:35	GL-06 TrMeD	Bishwajit Mandal (GIST)	11:15	YS-02 PVPD	Jae Hyeok Song (Kyung Hee Univ.)
		11:55	GL-02 PVPD	Song Yi Park (Pukyong Nat'l Univ.)	11:50	Lunch Break (1 hour)		11:25	YS-03 PVPD	Tingting Liu (Univ. of Osaka)
		12:10	Lunch Break (1 hour)		12:50	Poster Session 2 (1 hour 30 min)		11:35	Session Break (5 min)	
		13:10	Poster Session 1 (1 hour 30 min)		14:20	Break (10 min)		11:40	Conference Summary & Intro to KJF-ICOMEP 2027 & Closing (Secretary General, Co-Chair)	
		14:40	Session Break (10 min)		14:30	1. Excursion – Bus/Boat/Train tour (Optional: Advance sign-up required)				
		15:00	IL-07 HybMa	So-Jung Park (Ewha Womans U.)						
		15:20	IL-08 Other	Yumi Yakiyama (Univ. of Osaka)						
		15:40	IL-09 ChmSyn	Kyung Jin Lee (Chungnam Nat'l U.)						
16:00	Registration desk opens	16:00	GL-03 ChmSyn	Naoki Ando (Univ. of Osaka)		2. Research Center Workshops (Closed Sessions)				
		16:15	GL-04 SpecMe	Yongsup Park (Kyung Hee Univ.)						
		16:30								
		16:50	IL-10 EneSC	Han Young Woo (Korea Univ.)						
		17:10	IL-11 MoSBE	Yutaka Majima (Inst. of Sci. Tokyo)		3. Free Time for Discussion & Networking				
		17:30	SP-01 Industry	Jeffrey Lee (Korea Kiyon)						
		17:40	PL-2 HybMa	Taek Seung Lee (Chungnam Nat'l Univ.)						
18:00	Welcome Reception	18:15	Photo Time/Session Break							
		18:30	Banquet – "Fish & Seaside Kitchen"		18:30	Social Dinner				

Presentation details

- Plenary lecture: **35 min** (including Q&A)
- Invited lecture: **20 min** (including Q&A)
- General contributed lecture: **15 min** (including Q&A)
- Young scholar / Special lecture: **10 min** (including Q&A)
- Poster (1 hour 30 min): **Recommended size (W) 800–900 mm * (H) 1100–1200 mm** (Tolerable (W) 960mm * (H) 1400mm, Maximum (W) 1000mm * (H) 1800mm)

Program

2026.08.25 (Tue)	
Time	**Event**
16:00	**Registration desk opens**
18:00	**Welcome Reception – "Fingers & Chat", The Bay 101**

2026.08.26 (Wed)			
Time	**Type**	**Presenter (Affiliation)**	**Title**
08:40	**Opening**	**Conference Chair**	**Opening remarks**
Plenary Session 1, Chair: Prof. Ye-Jin Hwang (Inha Univ.)			
08:45	**PL-1 TrMeD**	**Jun Takeya (Univ. of Tokyo, Japan)**	**Charge Coherence in Self-assembled Organic Molecular Semiconductor Quantum-wells**
Session 1, Chair: Prof. Akito Masuhara (Yamagata Univ.)			
09:20	IL-01 TrMeD	**Jinsoo Joo (Korea Univ., Korea)**	Memtransistor Using Heterostructure of Organic-Semiconductor-TCTA and MoS2 for Reliable Neuromorphic Electronics
09:40	IL-02 ChmSyn	**Xugang Guo (SUSTech, China)**	Development and Catalyzed Doping of n-Type Polymer Semiconductors
10:00	**Session Break (20 min)**		
Session 2, Chair: Prof. Seo-Jin Ko (DGIST)			
10:20	IL-03 PVPD	**Keisuke Tajima (RIKEN, Japan)**	Precise Structural Control of Donor–Acceptor Copolymers for Organic Electronics
10:40	IL-04 PVPD	**Shinuk Cho (Ulsan Univ., Korea)**	Organic Solar Cells with Metal-Semiconductor-Metal Structure
11:00	IL-05 PVPD	**Akinori Saeki (Univ. of Osaka, Japan)**	Exploration of Next-Generation Solar Cells by Experiment-Based Materials Informatics
11:20	IL-06 PVPD	**Jaewon Chang (Pukyong Nat'l Univ., Korea)**	Quinoxaline-Based Organic Interfacial Layers for Perovskite Solar Cells
11:40	GL-01 PVPD	**Kodai Yamanaka (Hiroshima Univ., Japan)**	A Simply Synthesized and Highly Soluble Donor Polymer for Efficient Organic Photovoltaics
11:55	GL-02 PVPD	**Song Yi Park (Pukyong Nat'l Univ., Korea)**	Rethinking Exciton Dissociation in Organic Photodetectors: An Electrostatic Potential Perspective Driven by Molecular Multipole Moments
12:10	**Lunch Break (1 hour)**		
13:10	**Poster Session 1: Submission No. 002–049 and 151–224 – Vernazza Hall (3F) (1 hour 30 min)**		
14:40	**Session Break (20 min)**		
Session 3, Chair: Prof. Shiyoshi Yokoyama (Kyushu Univ.)			
15:00	IL-07 HybMa	**So-Jung Park (Ewha Womans U., Korea)**	Active Nanostructures through Self-assembly of Functional Polymers and Nanoparticles
15:20	IL-08 Other	**Yumi Yakiyama (Univ. of Osaka, Japan)**	Curved π-Electronic Materials Based on Sumanene: From Ultrahigh Dielectric Response to Bright Near-Infrared Emission
15:40	IL-09 ChmSyn	**Kyung Jin Lee (Chungnam Nat'l U., Korea)**	CVD based Functionalized Parylene Layer as a Flexible Gate Dielectric for Oxide Transistors
16:00	GL-03 ChmSyn	**Naoki Ando (Univ. of Osaka, Japan)**	Tuning the Properties of Thienoquinoid Compounds through Modification of Bridged Structures
16:15	GL-04 SpecMe	**Yongsup Park (Kyung Hee Univ., Korea)**	Enhanced Sensitivity in Low-Energy Inverse Photoemission Spectroscopy with an Off-Axis Parabolic Mirror for Efficient Light Collection
16:30	**Session Break (20 min)**		
Session 4, Chair: Prof. Minjeong Ha (GIST)			
16:50	IL-10 EneSC	**Han Young Woo (Korea Univ., Korea)**	Organic Semiconductor Photocatalysts for Green Hydrogen Production
17:10	IL-11 MoSBE	**Yutaka Majima (Inst. of Sci. Tokyo, Japan)**	Self-Terminating Electroless Gold Plating: A Versatile Nanofabrication Platform for Single-Molecule Electronics and Bioelectronics
17:30	SP-01 Industry	**Jeffrey Lee (Korea Kiyon, Korea)**	Controllable Vacuum Chamber Systems for Perovskite Research
Plenary Session 2, Chair: Prof. Yutaka Ie (Univ. of Osaka)			
17:40	**PL-2 HybMa**	**Taek Seung Lee (Chungnam Nat'l U., Korea)**	**Light Conversion for Photocatalysis and Photodynamic Therapy Using Organic Conjugated Polymer-Inorganic Hybrid Materials**
18:15	**Photo Time (5 min) / Session Break (10 min)**		
18:30	**Banquet – "Fish & Seaside Kitchen" (2F), Hanwha Resorts (For all participants)**		

2026.08.27 (Thu)				
Time	**Type**	**Presenter (Affiliation)**	**Title**	
Session 5, Chair: Prof. Ken-ichi Nakayama (Univ. of Osaka)				
08:40	IL-12 OLEDi	**Anthony D'Aleo** **(IPCMS, France)**	Mechanistic Insights into Exciplex-TADF in dibenzoylmethane borondifluoride Dyes: Pathways to Efficient rISC	
09:00	IL-13 OLEDi	**Dongwook Kim** **(Kyonggi Univ., Korea)**	Facilitating the Conversion of Triplet Excitons to Singlet Excitons in OLED: Computational Studies	
09:20	IL-14 OLEDi	**Takayuki Chiba** **(Yamagata Univ., Japan)**	Interparticle Cross-Linking of Perovskite Nanocrystals for Ultrathin Flexible X-ray Detection	
09:40	IL-15 EneSC	**Cheng-Liang Liu** **(Nat'l Taiwan Univ., Taiwan)**	Organic/Hybrid Thermoelectric Materials and Devices	
10:00	**Session Break (20 min)**			
Session 6, Chair: Prof. Sungjun Park (Ajou Univ.)				
10:20	IL-16 MoSBE	**Dae Sung Chung** **(POSTECH, Korea)**	Organic Electrochemical Transistors: Current Debates and Open Questions	
10:40	IL-17 TrMeD	**Hiroko Yamada** **(Kyoto Univ., Japan)**	Solvent-Desorption-Induced Superlattice Formation Yielding a High-Performance Porphyrin-Based Organic Semiconductor	
11:00	IL-18 ChmSyn	**Sung Yun Son** **(Kwangwoon Univ., Korea)**	Chemically Transformable Side Chains Enabling Multifunctional Conjugated Polymers	
11:20	GL-05 TrMeD	**Ryoma Hayakawa** **(NIMS, Japan)**	Reconfigurable Ternary Logic Circuits with Antiambipolar Transistors	
11:35	GL-06 TrMeD	**Bishwajit Mandal** **(GIST, Korea)**	Electrolyte-Induced Transition from Depletion-Mode to Quasi Accumulation-Mode Operation in PEDOT:PSS Organic Electrochemical Transistors	
11:50	**Lunch Break (1 hour)**			
12:50	**Poster Session 2: Submission No. 050–149** **– Vernazza Hall (3F) (1 hour 30 min)**			
14:20	**Session Break (10 min)**			
14:30	**Excursion – Bus/Boat/Train tour** **(Optional: Advance sign-up required)**		**Research Center Workshops** **(Closed Sessions)**	**Free Time for** **Discussion & Networking**
18:30	**Social Dinner – Haeundae Sagye Eonyang Bulgogi** **(For invited guests and committees only)**			

2026.08.28 (Fri)			
Time	**Type**	**Presenter (Affiliation)**	**Title**
Session 7, Chair: Prof. Beomjin Jeong (Pusan National Univ.)			
08:40	IL-19 TrMeD	**Shree P. Tiwari** **(IIT-Jodhpur, India)**	Flexible Devices for Smart Sustainable Systems
09:00	IL-20 ChmSyn	**Rie Makiura** **(Tohoku Univ., Japan)**	Functional Metal-Organic Framework Nanosheets Assembled at the Air/Liquid Interface
09:20	IL-21 EneSC	**Dong-Myeong Shin** **(Univ. of Hong Kong)**	Single-ion Conducting Borate Network Polymer Electrolytes for Lithium Metal Battery Applications
09:40	GL-07 TrMeD	**Tomoyuki Akutagawa** **(Tohoku Univ., Japan)**	Design of Electric Field - Polarization Responses in Molecular Ferroelectrics
09:55	YS-01 MoSBE	**Arti Singh** **(Pusan Nat'l Univ., Korea)**	Microfluidic Fabrication of Hydrogel Optical Fibers with Two Functions by Tuning Swelling for Simultaneous Ionic Conductivity and Light Transmission
10:05	**Session Break (15 min)**		
Session 8, Chair: Prof. Dong-Myeong Shin (Univ. of Hong Kong)			
10:20	IL-22 PVPD	**Hiroyuki Yoshida** **(Chiba Univ., Japan)**	Energy Cascade Formation at Electron Transport Layer/Electrode Interfaces
10:40	IL-23 MoSBE	**Jin-Woo Oh** **(Pusan Nat'l Univ., Korea)**	M13 Bacteriophage as a Programmable Biomaterial for Humanoid Olfactory Display
11:00	GL-08 PVPD	**Tsubasa Mikie** **(Hiroshima Univ., Japan)**	Fullerene Acceptors for Efficient Charge Separation
11:15	YS-02 PVPD	**Jae Hyeok Song** **(Kyung Hee Univ., Korea)**	Interfacial Engineering for Chloride-Rich Deep-Blue Perovskite LEDs via Self-Assembled Monolayers
11:25	YS-03 PVPD	**Tingting Liu** **(Univ. of Osaka, Japan)**	One Molecule, Two Pathways: Distinct Crystallization Mechanisms Enabled by Fluorinated Phenethylammonium in Tin Perovskite Solar Cells
11:35	**Session Break (5 min)**		
11:40	Closing	**Secretary General &** **Co-Chair**	**Conference Summary** **Intro to KJF-ICOMEP 2027 & Closing**

Plenary/Invited/Oral Presentations

August 26th, 2026 (Wed) Monterosso Hall (B1), Hanwha Resorts

Plenary Session 1 Chair : Ye-Jin Hwang (Inha Univ., Korea)

08:45	PL-1	**Charge Coherence in Self-assembled Organic Molecular Semiconductor Quantum-wells** Jun Takeya (Univ. of Tokyo, Japan)

Session 1 Chair : Akito Masuhara (Yamagata Univ., Japan)

09:20	IL-01	**Memtransistor Using Heterostructure of Organic-Semiconductor-TCTA and MoS2 for Reliable Neuromorphic Electronics** Jinsoo Joo (Korea Univ., Korea)
09:40	IL-02	**Development and Catalyzed Doping of n-Type Polymer Semiconductors** Xugang Guo (SUSTech, China)
10:00		**Break**

Session 2 Chair : Seo-Jin Ko (DGIST, Korea)

10:20	IL-03	**Precise Structural Control of Donor–Acceptor Copolymers for Organic Electronics** Keisuke Tajima (RIKEN, Japan)
10:40	IL-04	**Organic Solar Cells with Metal-Semiconductor-Metal Structure** Shinuk Cho (Ulsan Univ., Korea)
11:00	IL-05	**Exploration of Next-Generation Solar Cells by Experiment-Based Materials Informatics** Akinori Saeki (Univ. of Osaka, Japan)
11:20	IL-06	**Quinoxaline-Based Organic Interfacial Layers for Perovskite Solar Cells** Jaewon Chang (Pukyong Nat'l Univ., Korea)

11:40	GL-01	**A Simply Synthesized and Highly Soluble Donor Polymer for Efficient Organic Photovoltaics** Kodai Yamanaka (Hiroshima Univ., Japan)
11:55	GL-02	**Rethinking Exciton Dissociation in Organic Photodetectors: An Electrostatic Potential Perspective Driven by Molecular Multipole Moments** Song Yi Park (Pukyong Nat'l Univ., Korea)
12:10		**Lunch Break**
13:10		**Poster Session 1 − Vernazza Hall (3F)**
14:40		**Break**
		Session 3 Chair : Shiyoshi Yokoyama (Kyushu Univ., Japan)
15:00	IL-07	**Active Nanostructures through Self-assembly of Functional Polymers and Nanoparticles** So-Jung Park (Ewha Womans U., Korea)
15:20	IL-08	**Curved π-Electronic Materials Based on Sumanene: From Ultrahigh Dielectric Response to Bright Near-Infrared Emission** Yumi Yakiyama (Univ. of Osaka, Japan)
15:40	IL-09	**CVD based Functionalized Parylene Layer as a Flexible Gate Dielectric for Oxide Transistors** Kyung Jin Lee (Chungnam Nat'l U., Korea)
16:00	GL-03	**Tuning the Properties of Thienoquinoid Compounds through Modification of Bridged Structures** Naoki Ando (Univ. of Osaka, Japan)
16:15	GL-04	**Enhanced Sensitivity in Low-Energy Inverse Photoemission Spectroscopy with an Off-Axis Parabolic Mirror for Efficient Light Collection** Yongsup Park (Kyung Hee Univ., Korea)

16:30		**Break**
		Session 4 Chair : Minjeong Ha (GIST, Korea)
16:50	IL-10	**Organic Semiconductor Photocatalysts for Green Hydrogen Production** Han Young Woo (Korea Univ., Korea)
17:10	IL-11	**Self-Terminating Electroless Gold Plating: A Versatile Nanofabrication Platform for Single-Molecule Electronics and Bioelectronics** Yutaka Majima (Inst. of Sci. Tokyo, Japan)
17:30	SP-01	**Controllable Vacuum Chamber Systems for Perovskite Research** Jeffrey Lee (Korea Kiyon, Korea)
		Plenary Session 2 Chair : Yutaka Ie (Univ. of Osaka, Japan)
17:40	PL-2	**Light Conversion for Photocatalysis and Photodynamic Therapy Using Organic Conjugated Polymer-Inorganic Hybrid Materials** Taek Seung Lee (Chungnam Nat'l U., Korea)
18:15		**Photo Time / Break**
18:30		**Banquet** **"Fish & Seaside Kitchen" (2F), Hanwha Resorts**

August 27th, 2026 (Thu) Monterosso Hall (B1), Hanwha Resorts

		Session 5 Chair : Ken-ichi Nakayama (Univ. of Osaka, Japan)
08:40	IL-12	**Mechanistic Insights into Exciplex-TADF in dibenzoylmethane borondifluoride Dyes: Pathways to Efficient rISC** Anthony D'Aleo (IPCMS, France)
09:00	IL-13	**Facilitating the Conversion of Triplet Excitons to Singlet Excitons in OLED: Computational Studies** Dongwook Kim (Kyonggi Univ., Korea)

09:20	IL-14	**Interparticle Cross-Linking of Perovskite Nanocrystals for Ultrathin Flexible X-ray Detection** Takayuki Chiba (Yamagata Univ., Japan)
09:40	IL-15	**Organic/Hybrid Thermoelectric Materials and Devices** Cheng-Liang Liu (Nat'l Taiwan Univ., Taiwan)
10:00		**Break**
		Session 6 Chair : Sungjun Park (Ajou Univ., Korea)
10:20	IL-16	**Organic Electrochemical Transistors: Current Debates and Open Questions** Dae Sung Chung (POSTECH, Korea)
10:40	IL-17	**Solvent-Desorption-Induced Superlattice Formation Yielding a High-Performance Porphyrin-Based Organic Semiconductor** Hiroko Yamada (Kyoto Univ., Japan)
11:00	IL-18	**Chemically Transformable Side Chains Enabling Multifunctional Conjugated Polymers** Sung Yun Son (Kwangwoon Univ., Korea)
11:20	GL-05	**Reconfigurable Ternary Logic Circuits with Antiambipolar Transistors** Ryoma Hayakawa (NIMS, Japan)
11:35	GL-06	**Electrolyte-Induced Transition from Depletion-Mode to Quasi Accumulation-Mode Operation in PEDOT:PSS Organic Electrochemical Transistors** Bishwajit Mandal (GIST, Korea)
11:50		**Lunch Break**
12:50		**Poster Session 2 – Vernazza Hall (3F)**
14:20		**Break**

14:30
- **Excursion – Bus/Boat/Train tour (Optional)**
- **Research Center Workshops (Closed Sessions)**
- **Free Discussion & Networking (Individual)**

18:30 **Social Dinner (For invited guests and committees only)**
Haeundae Sagye Eonyang Bulgogi

August 28th, 2026 (Fri) Monterosso Hall (B1), Hanwha Resorts

Session 7 Chair : Beomjin Jeong (Pusan National Univ., Korea)

08:40 IL-19 **Flexible Devices for Smart Sustainable Systems**
Shree P. Tiwari (IIT-Jodhpur, India)

09:00 IL-20 **Functional Metal-Organic Framework Nanosheets Assembled at the Air/Liquid Interface**
Rie Makiura (Tohoku Univ., Japan)

09:20 IL-21 **Single-ion Conducting Borate Network Polymer Electrolytes for Lithium Metal Battery Applications**
Dong-Myeong Shin (Univ. of Hong Kong)

09:40 GL-07 **Design of Electric Field - Polarization Responses in Molecular Ferroelectrics**
Tomoyuki Akutagawa (Tohoku Univ., Japan)

09:55 YS-01 **Microfluidic Fabrication of Hydrogel Optical Fibers with Two Functions by Tuning Swelling for Simultaneous Ionic Conductivity and Light Transmission**
Arti Singh (Pusan Nat'l Univ., Korea)

10:05 **Break**

Session 8 Chair : Dong-Myeong Shin (U. of Hong Kong, Hong Kong)

10:20 IL-22 **Energy Cascade Formation at Electron Transport Layer/Electrode Interfaces**
Hiroyuki Yoshida (Chiba Univ., Japan)

10:40	IL-23	**M13 Bacteriophage as a Programmable Biomaterial for Humanoid Olfactory Display** Jin-Woo Oh (Pusan Nat'l Univ., Korea)
11:00	GL-08	**Fullerene Acceptors for Efficient Charge Separation** Tsubasa Mikie (Hiroshima Univ., Japan)
11:15	YS-02	**Interfacial Engineering for Chloride-Rich Deep-Blue Perovskite LEDs via Self-Assembled Monolayers** Jae Hyeok Song (Kyung Hee Univ., Korea)
11:25	YS-03	**One Molecule, Two Pathways: Distinct Crystallization Mechanisms Enabled by Fluorinated Phenethylammonium in Tin Perovskite Solar Cells** Tingting Liu (Univ. of Osaka, Japan)
11:35		**Break**

Closing Session

11:40	**Conference Summary** **Intro to KJF-ICOMEP 2027**

Poster Presentations

August 26th, 2026 (Wed) Vernazza Hall (3F), Hanwha Resorts

PS1-002 **Thickness-Dependent Optimization of TiO_2 Composite Dielectrics for Water Droplet Electricity Generators**
Yuta Suzuki, Yusuke Aoki
Graduate School of Engineering Mie University, Japan

PS1-009 **Hydrolytic behaviors of l-PLA/PBS and l-PLA/PBEAS mixture monolayers and their mechanical properties**
Gayeon Kim[1], Won-Ki Lee[1]*, Byeonguk Kim[1], Vasi Shaikh[2], Young-up Jin[1], Seong-ho Jang[3]
[1]BB21[+], Division of Applied Chemical Engineering, Pukyong National University, Korea
[2]Department of Chemistry, Dr. Vishwanath Karad MIT World Peace University, India
[3]Department of Bioenvironmental Energy, Pusan National University, Korea

PS1-011 **Two-Dimensional Perovskite Nanosheet-Based Nanocrossbar Ferroelectric Tunnel Junction Memory**
Aditya Nirmale[1], Yan Li[2], Seiichiro Izawa[1], Minoru Osada[2], and Yutaka Majima[1]
[1]Materials and Structures Laboratory (MSL), Institute of Integrated Research, Institute of Science Tokyo, Japan.
[2]Institute of Materials and Systems for Sustainability (IMaSS), Nagoya University, Japan

PS1-014 **Molecular Design and Low-Temperature Mechanical Property Prediction of a PA/TPU/Amino-PDMS Ternary Hybrid Hot-Melt Adhesive for Cryogenic Applications**
Dae-gil Jeon[1], Chul Gyeong Jung[1], Youngeup Jin[2]*
[1]Silverstar Chemical Co., Ltd. Gimhae-si, Gyeongsangnam-do, Korea
[2]Department of Energy and Chemical Materials Engineering, Pukyong National University, Korea

PS1-015 **Photoinduced High-Resolution Ultranarrow Red Emission for Pure Organic T2T Microcrystals**
Dayeong Kwon, Sang-hun Lee, Jeongyong Kim, and Jinsoo Joo
Korea University, Korea
Sungkyunkwan University, Korea

PS1-017 **Solution-Processed Nanoscale MXene Thin Films for High-Performance Shape-Adaptable Wearable Heaters**
Jiha Kang, Tae Hyun Park
Department of Organic Materials Engineering, Chungnam National University, Korea

PS1-018 **Position-Engineering of Terphenyl-Based Hosts for the Optimization of Blue Phosphorescent OLEDs**
Hayeon Kim, Seungjae Lee, Changmin Lee, Seungeun Lee, Kiho Lee, Hayoon Lee, and Jongwook Park
Integrated Engineering, Department of Chemical Engineering, Kyung Hee University, Korea

PS1-019 **Highly Deformable Capacitive Sensor Based on Self-Assembled Block Copolymer Structural Colors**

Daeun Seong, Tae Hyun Park
Chungnam National University, Korea

PS1-021 **Low-Toxicity Ternary Solvent Engineering for Scalable Slot-Die Coated Perovskite Solar Cells**

Jaswinder Singh, Sushil Shivaji Sangale, Do-Hyung Kim, Sung-Nam Kwon, and Seok-In Na
[1]Department of Flexible and Printable Electronics, Jeonbuk National University, Korea
[2]New & Renewable Energy Laboratory, KEPCO Research Institute, Korea

PS1-022 **Synergistic Bilayer Passivation for Efficient and Stable Vacuum-Processed Perovskite Solar Cells**

Mohammadhossein Kohan, Sang-Heon Lee, Jaswinder Singh, Sung-Nam Kwon, and Seok-In Na
Department of Flexible and Printable Electronics, Jeonbuk National University, Korea

PS1-023 **Inkjet Printed Perovskite Solar Cells by Solvent Engineering Approach**

Sushrut Mane, Sung-Nam Kwon, Seok-In Na
Department of Flexible and Printable Electronics, Jeonbuk National University, Korea

PS1-024 **Development and Characterization of a Microcapsule-Based Latent Curing Agent for Low-Temperature Storage-Stable Epoxy Resin Systems Applied to BSP Films**

Hokyoon Jeon[1,3*], Doohun Kim[1], Jehwan Chun[1], Booyoung Jung[1], Wonseon Seo[2], and Wonki Lee[3]
[1]Fine & Specialty Chemistry Research Group, Korea Institute of Materials Convergence Technology, Korea
[2]CHEMLAND CO., LTD., Anseong, Korea
[3]Division of Applied Chemical Engineering, Pukyong National University, Busan, Korea

PS1-026 **Dual-Gate Organic Antiambipolar Transistors for Reconfigurable Binary and Ternary Logic Circuits**

Donguk Kim, Ryoma Hayakawa, and Yutaka Wakayama
Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), Japan

PS1-027 **Fabrication of Ultrathin PhOLEDs via Molecular Co-Deposition: Enhanced Blue Color Purity and Green External Quantum Efficiency**

Sang Wook Song[1], Sang-hun Lee[1], Jeongyong Kim[2], and Jinsoo Joo[1]*
[1]Department of Physics, Korea University, Republic of Korea
[2]Department of Energy Science, Sungkyunkwan University, Republic of Korea

PS1-028 **Molecular Design of DTP-Based Non-Fullerene Acceptors for SWIR Organic Photodetectors**

Honghyeon Park[1], Jong H. Kim[2], Seo-jin Ko[3], and Jong-Woon Ha[1]*
[1]Department of Materials Engineering and Convergence Technology, Gyeongsang National University, Korea
[2]Department of Molecular Science and Technology, Ajou University, Korea
[3]Department of Energy Science and Engineering, Daegu Gyeongbuk Institute of Science and Technology (DGIST), Korea

PS1-029 **Investigating the Role of Thiophene π-Bridge Units in Fused-Ring Donor Polymers for Inverted Polymer Solar Cells**

Qurrotun Ayuni Khoirun Nisa[1,2], Dong Hwan Son[1,2], Young-Seok Shon[3], Joon-Seo Park[4], and Joo Hyun Kim[1,2*]
[1]Department of Polymer Engineering, Pukyong National University, Busan 48513, Korea
[2]CECS Research Institute, Core Research Institute, Busan 48513, Korea
[3]Department of Chemistry and Biochemistry, California State University, Long Beach, CA 90840, USA
[4]Department of Chemistry, Eastern University, St. Davids, PA 19087-3696, USA

PS1-030 **Copolymer Engineering of BDTF-Based Donor Polymers toward High-Performance Polymer Solar Cells**

Dong Hwan Kim, Qurrotun Ayuni Khoirun Nisa, Young Seok Shon, Joon-Seo Park, Joo Hyun Kim
[1]Department of Polymer Engineering, Pukyong National University, Busan, 48513, Korea
[2]CECS Research Institute, Core Research Institute, Busan, 48513, Korea
[3]Department of Chemistry and Biochemistry, California State University, Long Beach, CA 90840, USA
[4]Department of Chemistry, Eastern University, St. Davids, PA 19087-3696, USA

PS1-031 **Viologen Molecular Doping Enables Efficient Charge Transport and Reduced Recombination for High-Performance $MAPbI_3$ Perovskite Solar Cells**

Mutiara Sirait[1,2], Dong Hwan Son[1,2], Qurrotun Ayuni Khoirun Nisa, Young-Seok Shon[3], Joon-Seo Park[4] and Joo Hyun Kim[1,2*]
[1]Department of Polymer Engineering, Pukyong National University, 48513, Korea
[2]CECS Research Institute, Core Research Institute, Busan 48513, Korea
[3]Department of Chemistry and Biochemistry, California State University, Long Beach, CA 90840, USA
[4]Department of Chemistry, Eastern University, St. Davids, PA 19087-3696, USA

PS1-035 **Three-Dimensional Carbon-Based Microdevices with Surface-Normal Electrodes for Tunable Low-Voltage Joule Heating**

Yang-Hwo Park, Seok-Won Joo, Ju-Hyung Kim
Department of Energy Systems Research, Ajou University, Republic of Korea

PS1-037 **Dual-Site Interfacial Regulation by Furan-Substituted Phosphine Oxide for Efficient Wide-Bandgap Perovskite Solar Cells**

Juan Anthony Prayogo, Annisa Nurul Syabila, and Jaewon Chang
Department of Energy and Chemical Materials Engineering, Pukyong National University, Korea

PS1-039 **Probing Symmetry-Controlled Charge-Transfer State Formation in Y6-Derived Acceptors by Ultrafast Spectroscopy**

Kayoung Cho, Min Gyu Kang, Han Young Woo, JaeHong Park
Ewha Womans University, Korea University, Korea

PS1-040 **Effects of Impurity Removal on Thermoelectric Properties of Single-Walled Carbon Nanotubes with Different Tube Diameters**

Kazuma Hida[1], Takeshi Saito[2], Yasuko Koshiba[1,3], Azumi Akiyama[1,3], Masahiro Funahashi[1,3]*, Shohei Horike[1,3,4*]
[1]Department of Chemical Science and Engineering, Kobe University, Japan
[2]National Institute of Advanced Industrial Science and Technology (AIST), Japan
[3]Research Center for Membrane and Film Technology, Kobe University, Japan
[4]Center for Environmental Management, Kobe University, Japan

PS1-041 **Wavelength-Operating Optoelectronic Memory Based on Internal Photochemical Reaction**
Tai Kobayashi[1], Ryosuke Nishikubo[1,2], Akinori Saeki[1,2]
[1]Univ. of Osaka, Japan, [2]ICS-OTRI, Japan

PS1-042 **Urea-Based Additive-Induced Crystallinity Enhancement in Sequentially Evaporated $CsFAPbI_3$**
Ji Soo Kim, Yunjeong Kang
Ewha Womans University, Korea

PS1-043 **Enhanced Touch Sensitivity of Flexible PDMS-Based Fringe-Field Capacitive Sensors Using an Electrically Floating Conductive Layer**
Seung-Yul Lee[1,2], Seokwon Joo[3], and Ju-Hyung Kim[1,2*]
[1]Department of Chemical Engineering, Ajou University, Korea
[2]Department of Energy Systems Research, Ajou University, Korea
[3]Research Institute for Convergence Science, Seoul National University, Korea

PS1-045 **Crystal Structures and Proton Dynamics in Chiral DABCO–Camphoric Acid Cocrystals**
Rina Katsuta,[1] Shun Dekura,[1,2] Shiori Harada,[1] Tetsu Sato,[1,2] Jumpei Moriguchi,[3] Ryo Tsunashima,[3] Tomoyuki Akutagawa[1,2]
[1]Graduate School of Engineering, Tohoku University, Japan
[2]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan
[3]Graduate School of Sciences and Technology for Innovation, Yamaguchi University, Japan

PS1-046 **Molecular Design of Polymer Electrolytes with Tailored Mechanical Properties for Lithium Metal Batteries**
Dongguk Kang, Wonho Lee
Kumoh National Institute of Technology, Korea

PS1-048 **AI-assisted Analysis of In-situ Spectroscopy for Understanding Perovskite Crystallization and Film/Device Properties**
Ryoji Shimomura, Ryosuke Nishikubo, Akinori Saeki
Univ. of Osaka, Japan

PS1-049 **Fabrication of Ag Nanomesh Structures Using Nanosphere Lithography with Oxygen Plasma Treatment for Wavelength Selective Electrode**
Kotomi Otomo[1], Takayuki Kiba[1], Midori Kawamura[1], Daisuke Ohori[2], Kazuhiko Endo[3]
[1]Division of Applied Chemistry, Kitami Institute of Technology, Japan
[2]Faculty of Engineering Science, Kansai University, Japan
[3]Institute of Fluid Science, Tohoku University, Japan

PS1-151 **Thienoquinoid-based Acceptors with Short-Wavelength Infrared Absorption for Organic Photodetectors**
Iori Atobe, Risa Ueda, Kodai Yamanaka, Tsubasa Mikie, Itaru Osaka
Graduate School of Advanced Science and Engineering, Hiroshima University, Japan

PS1-152 **Dynamic Mechano-Optical Reflection in Main-Chain Chiral Nematic Liquid Crystal Elastomers**

Davit Galih Raga Siwi, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS1-153 **Development of Semiconducting Polymers Based on Dithiazolonaphthobisthiadiazole for Organic Photovoltaics**

Kota Oshimo, Tsubasa Mikie, Itaru Osaka
Hiroshima University, Japan

PS1-154 **Detection of Food Spoilage-Related Amine compounds via Conductivity Changes in a Conjugated Polymer**

Jaeyong Lee[1], Jongho Kim[1'2*]
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PS1-155 **Clarification of Material Effects in Droplet-Based Electricity Generators Using Time-Integrated Charge and Energy Analysis**

Yusuke Aoki, Yuta Suzuki
Mie University, Japan

PS1-158 **Dibenzofuran-Incorporated Hole Transport Materials with High Bond Dissociation Energy for Efficient and Long-Lived Quantum Dot Light-Emitting Diodes**

Youngjun Hwang and Youngu Lee[*]
Daegu Gyeongbuk Institute of Science and Technology, Korea

PS1-160 **Chloride-Mediated Crystallinity Control in Two-Dimensional Tin Halide Perovskite Transistors**

Hyoungha Ryu[1], Youjin Reo[1*], Wantae Park[1], Donghyeon Lee[1], Hamin Choi[1], Soohwan Yoo[1], Ao Liu[2], HuiHui Zhu[3*] and Yong-Young Noh[1*]
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PS1-161 **Highly Stretchable Bulk Heterojunction Thin films for Organic Photodetectors**

Soyoon Kim[1,2], Hee-Seong Yang[3], Hyeonjin Yoo[1,2], Pyeong Hwa Jung[3], Sohyun Cho[1,2], and Tae-Lim Choi[4*], In-Hwan Lee[3*], Byoung Hoon Lee[1,2*]
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[3]Department of Chemistry, Ajou University, Korea
[4]Department of Materials, ETH Zürich, Switzerland

PS1-162 **Odd-Even Alkyl Spacer Engineering of 2D Dion-Jacobson Tin Perovskites for High-Performance p-Type Transistors**

Wantae Park[1], Mingoo Kwon[1], Dong Hyeon Lee[1], Soohwan Yoo[1], Wonryeol Yang[1], Ji-sang Park[2*], Ao Liu[3*], Youjin Reo[1*], Huihui Zhu[4*], and Yong-Young Noh[1*]
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PS1-163 **Thermal-Gradient-Driven Assembly of Hollow MOF Superlattices into Co Single-Atom Carbon Electrocatalysts**

Donggyun Kim, Jeonghun Kim
Dept. of Chemical and Biomolecular Engineering, Yonsei University, Korea

PS1-164 **Functionalized PEDOT:PSS Engineered Double Layer Aerogel for Efficient Solar-driven Desalination**

Dongha Lee, Jeonghun Kim
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

PS1-165 **Electron-Conductive Binders for Silicon Anodes in 5 MPa All-Solid-State Batteries**

Minseok Jeong, Seunggoo jun, Jeonghun Kim
Yonsei University, Korea

PS1-166 **Tuning Supramolecular Handedness in Chiral Non-Fullerene Acceptors for NIR CPL Detection**

Kwangmin Kim[1], Jaeyong Ahn[2,3], Seul Lee[1], Sangwook Lee[2], SungHyun Hur[4], Joon Hak Oh[2*], and BongSoo Kim[1,4,5*]
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PS1-167 **Electrolyte-Dependent Ion Trapping and Synaptic Responses in OMIECs-Based Organic Electrochemical Diodes**

Minhu Huang[1], Il-young Jo[1], and Myung-Han Yoon[1*]
[1]Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, Korea

PS1-168 **UV-Crosslinked Azide-Functionalized Semiconducting Carbon Nanotube Thin Films with Enhanced Stretchability**

Doyoung Kwon, Woo Chan Kim, Bogyu Lim, Byoung Hoon Lee
Ewha Womans University, Korea
Chungbuk National University, Korea

PS1-169 **Improving the Efficiency and Thermal Stability of Organic Solar Cells via Self-Doped Perylene Diimide-Based Polymeric Electron Transport Layers**

Seul Lee[1], Youngwan Lee[1], Seunggu Lee[2], Kihyun Bae[3], Bumjoon J. Kim[3*], Yongsup Park[2*], BongSoo Kim[*1,4,5]
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PS1-170 **Efficient covalent functionalization of multi-walled carbon nanotubes in a flow reactor**

Jea Ahn, Taehoon Kang, and Ye-Jin Hwang
Department of Chemistry and Chemical Engineering, Inha University, Incheon, Korea

PS1-171 **Contact Engineering of Se-alloyed TeOx Thin-Film Transistors Using a Tellurium Interlayer**

Sungjae Cho, Jaeyun Lee, Hamin Choi, Soonhyo Kim, Donghyeon Lee, Junseong Park, Sehwa Hong, and Yong-Young Noh
Department of Chemical Engineering, Pohang University of Science and Technology, Korea

PS1-172 **Defect-Engineered Flexible MoS_2, WS_2 and WSe_2 Optoelectronic Synapse Arrays via Vacuum Filtration Patterning**

Yun Goo Ro, Hyunhyub Ko
Ulsan National Institute of Science and Technology (UNIST), Korea

PS1-173 **Robust Biodegradable Synapse with Sub-Biological Energy and Extended Memory for Intelligent Reflexive System**

Yoojin Chang, Sangyun Na, Yun Goo Ro, Cheolhong Park, Seokhee Jung, Yong-Jin Park, Min Sub Kwak, Jeeyoon Kim, Hyeji Oh, Jaejun Kim, Hyunhyub Ko
Ulsan National Institute of Science and Technology, Korea

PS1-174 **A Real-Time, Non-Contact Photothermal Data Acquisition Platform Integrating Automated Temperature Measurement and Thermal Imaging**

Dohyun Kim, Banyu Firdaus Soeriawidjaja, and Minseok Kwak
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PS1-175 **Polymeric Nanoparticles as a Versatile Platform for Fluorescent Cell-Imaging and Electrochemical Sensing**

Jio Kang[1], and Minseok Kwak[1,2*]
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[2]Department of Chemistry, Pukyong National University, Korea

PS1-176 **Optimization of the Fabrication Process for Low-Voltage Electrically Programmable and Erasable Organic Floating-Gate Memories**
Akira Hosaka, Takashi Kobayashi, Hiroyoshi Naito, Takashi Nagase
Department of Physics and Electronics, Osaka Metropolitan University, Japan
RIMED, Osaka Metropolitan University, Japan
RISA, Ritsumeikan University, Japan

PS1-177 **$PbCl_2$-Regulated Crystallization Kinetics for Homogeneous Halide Distribution in Inverted $CsPbI_2Br$ Perovskite Solar Cells**
Hanbo Jung[1], Toshinori Matsushima[1*], and Zhanglin Guo[1*]
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PS1-178 **Low-Energy Patternable Organic Semiconductor Utilizing Carbene-Driven 3-Dimensional Crosslinker**
Woojin Lee[1], Jiyeon Ha[1], Yujin Seong[2], Hyukmin Kweon[1], Ukjin Jeong[1], Seokran Choi[1], Borina Ha[1], BongSoo Kim[2], Do Hwan Kim[1]
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PS1-179 **Freestanding PEDOT:PSS/Protic Ionic Liquid Nanomesh for Plant Health Monitoring**
Hyun-Seo Kim[1,2], Minjae Kim[1,2], Jae Joon Kim[3*] and Byoung Hoon Lee[1,2*]
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PS1-180 **Iontronic Fringing-Field Proximity Sensors via Edge-Rich Stretchable Electrodes for High-Sensitivity Non-Contact Detection**
Geonyoung Jung, Haryeong Cho, Min Sub Kwak, Jiho Son, Hyunhyub Ko
Ulsan National Institute of Science and Technology, Korea

PS1-183 **Chlorine Substitution Enables Structural Robustness against Doping-Induced Disorder in Isoindigo-based Thermoelectric Polymers**
Jinju Jeong[1], Geon Tak Bae[2,3], Jaeyoung Jang[3*], and Jong-Woon Ha[1*]
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PS1-185 **Organosilane-Mediated Dispersion of Barium Titanate in Elastomeric Emission Layers toward High-Performance Alternating-Current Electroluminescent Devices**
Eunji Jeong, Jinhwan Yoon
University of Seoul, Korea

PS1-186 **Strain-Insensitive Piezoionic Hydrogel for Static and Dynamic Pressure Sensing**
Prisca Putri Elesta, Seo YuSong, Jinhwan Yoon
University of Seoul, Korea

PS1-187 **Studies of Antimony Precursors Containing Alkoxy Carboxamide and Alkoxy Thiocarboxamide**

Mi Jeong Kim[1,2], Bo Keun Park[2]
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PS1-188 **Memory Characteristics of Organic Floating-Gate Transistors Using Naphthalenediimide-Based Donor–Acceptor Polymers**

Mitsumasa Shimada, Naoyuki Nishida, Takashi Kobayashi, Hiroyoshi Naito, Takashi Nagase
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RIMED, Osaka Metropolitan University, Japan
RISA, Ritsumeikan University, Japan

PS1-189 **Electroluminescence and Photovoltaic Characteristics of Inverted TTA-UC OLEDs Using Alkyl-Substituted Fullerene Derivatives**

Takuma Okaishi[1], Kazuki Kojima[1], Takashi Kobayashi[1,2], Hiroyoshi Naito[1,2,3], and Takashi Nagase[1,2*]
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PS1-191 **Light-Tunable Memory Characteristics of Floating-Gate Organic Transistor Memories for Neuromorphic Applications**

Kotaro Kiyota, Shusei Hattori, Takashi Kobayashi, Hiroyoshi Naito, Takashi Nagase
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[2]RIMED, Osaka Metropolitan University, Japan
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PS1-192 **Chiral Bifacial π-Conjugated Ladder Polymers with Chirality-Induced Spin Selectivity**

Fumitaka Ishiwari[1,2*], Kazuharu Murotani[2], Akinori Saeki[2]
[1]Department of Applied Chemistry, Tokyo Metropolitan University, Japan
[2]Department of Applied Chemistry, The University of Osaka, Japan

PS1-193 **Solution-Processed Top-Gate Organic Transistors Using Slot-Die Coating for Nonvolatile Memory Applications**

Ryo Endo[1], Akira Hosaka[1], Takashi Kobayashi[1,2], Hiroyoshi Naito[1,2,3], and Takashi Nagase[1,2]
[1]Department of Physics and Electronics, Osaka Metropolitan University, Japan
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PS1-194 **Relationship between Vertical Mobility and Mobility Anisotropy in Organic Semiconductor Films Determined by a Vertical-Lateral Mobility Measurement Method**

Ken-ichi Nakayama, Shoei Shiki, Naoya Aizawa, and Mitsuharu Suzuki
The University of Osaka, Japan
Hokkaido University, Japan

PS1-196 **Spatial separation of redox centers enables high capacity utilization in carbazole-based organic electrode materials**

Joo hwan Eo[1,3], Yu Kyung Lee[2], Min Sang Kwon[3*], Dong Wook Chang[2*], Ji Eon Kwon[1*]
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PS1-197 **Coordination-Driven Crosslinking of Conductive and Mechanical Polymers for Self-Healing Ionic Thermoelectrics**

Hyeonsu Choi, Jihyun Kim, Byeonggwan Kim
Department of Chemical Engineering and Applied Chemistry, Chungnam National University, Korea

PS1-199 **Fabrication of Flexible Thermoelectric Generators via Controlled Doping Processes of Large-Area Carbon Nanotube Sheets**

Kanghyun Jo[1], Yunseong Ji[2], Jihyun Kim[1], Dae Woo Kim[3], Byeonggwan Kim[1*]
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PS1-200 **Interfacial Ion-Transport Networks for High-Force Artificial Muscles**

So Young Kim, Jeong Sub Lim, Hanbin Choi, Minjeong Kim, Wonjun Baek, and Do Hwan Kim
Hanyang University, Korea

PS1-201 **One-Shot Carbon-Insertion Annulation Toward Polycyclic Carbocations with Near-Infrared Optical, Electronic, and Photocatalytic Properties**

Daisuke Doi[1], Masahiro Hayakawa[1], Ryosuke Sowa[1], and Takuji Hatakeyama[1]
[1]Graduate School of Science, Kyoto University, Japan

PS1-202 **Development of Ladder-Type Oligomers via Multiple Boron Bridging toward Organic Semiconductor Laser Materials**

Ryota Uchida[1], Masashi Mamada[1], Atul Shukla[2], Evan G. Moore[2], Shih-Chun Lo[2], Ebinazar B. Namdas[2], Takuji Hatakeyama[1]
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PS1-203 **Pixel-Aligned Visible–Near-Infrared Imaging Using a Transparent Organic Photodiode Integrated on CMOS**

Sangjun Lee, Dae Sung Chung
Pohang University of Science and Technology, Korea

PS1-204 **Stretchable High-k Oxide Dielectric with Azide-functionalized Ligand**

Suryeon Jang and Daesung Chung
Pohang University of Science and Technology, Korea

PS1-205 **Rational Molecular Design of π-Extended Thiazolothiazole for High-Performance UV-OPDs Seamlessly Integrated with CMOS**

Won Jun Pyo, Dae Sung Chung
Pohang University of Science and Technology, Korea

PS1-206 **Enhancing Organic Photodiodes Performance in the SWIR Region by Tuning Open/Closed-shell Characteristics**

Seung-gi Lee, Dae Sung Chung
Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Korea

PS1-207 **Ligand-Engineered Stretchable Metal Oxide Transistors Using Styrene-Functionalized β-Diketone Ligands**

Hyo Min Ahn, Dae Sung Chung
Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Korea

PS1-208 **Electrostatic Ion Trapping in Organic Electrochemical Transistors for Record Neuromorphic Memory Performance**

Junseo Kim, Won Jun Pyo, Syed Zahid Hassan, Hye Ryun Sim, and Dae Sung Chung
Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Korea

PS1-209 **Visible-Light Photoprogrammable Transistors Enabled by an All-Organic Triplet-Sensitized Diarylethene Channel Layer**

Jieun Kwon[1], Syed Zahid Hassan[1], Gayoung Ham[2], Seonghyeon Kang[3], Geoneop Choi[1], Sanghyeok An[1], Hye Ryun Sim[1], Suryeon Jang[1], Chang Yun Son[3*], Hyojung Cha[2*], and Dae Sung Chung[1*]
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PS1-210 **Persistent SWIR Photonic Memory for Low-Light Neuromorphic Sensing**

Chan So, Dae Sung Chung
Pohang University of Science and Technology, Korea

PS1-211 **Development of PbS Quantum Dot-Based SWIR Avalanche Photodiodes Using a Photocrosslinkable Ligand for LiDAR Applications**

Kyobin Park, Sangjun Lee, Dae Sung Chung
Pohang University of Science and Technology, Korea

PS1-212 **Semi-IPN Networked Organic Electrochemical Transistors for Multifunctional In-Memory pH Sensing**

Hyunjoon Shin, Jongwi Kim, Hayoung Oh, Jihong Kim, Do Hwan Kim
Department of Chemical Engineering, Hanyang University, Korea

PS1-213 **Deterministic Chaos-Driven Gyroscopic Thermal Evaporation for Biomimetic 3D Curvilinear Optoelectronics**
Taekmin Kim[1], Chan So[1] and Dae Sung Chung[1*]
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PS1-214 **Vacuum-Evaporated Organic Photodiodes with Enhanced Bandwidth for Multi-Channel Optical Communications**
Young Gyoung Lee, Dae Sung Chung
Pohang University of Science and Technology, Korea

PS1-215 **A Tetradentate Deep-Blue Pt(II) Complex with High Efficiency for Solution-Processed OLEDs**
Liu Guohong, Sung-Ho Jin
Department of Chemistry Education, Graduate Department of Chemical Materials, Institute for Plastic Information and Energy Materials, Sustainable Utilization of Photovoltaic Energy Research Center (ERC), Pusan National University, Busan, Korea

PS1-216 **Molecular Aggregation Control in Vacuum-Depositable NFAs Enables High-Performance NIR OPDs through Trap Suppression and Enhanced Charge Dynamics**
Geoneop Choi[1], Gyuri Kim[2], Jiyoung Shin[2], Jieun Kwon[1], Suryen Jang[1], In Hwan Jung[2*], and Dae Sung Chung[1]
[1]Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Korea
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PS1-217 **Synthesis of a Sterically Hindered Cyclometalated Platinum(II) Complex with Reduced Aggregation for High-Efficiency Solution-Processed Blue OLEDs**
Magapati Gangasubrahmanyam, Chetan Lakshman, Sung-Ho Jin
Department of Chemistry Education, Graduate Department of Chemical Materials, Institute for Plastic Information and Energy Materials, Sustainable Utilization of Photovoltaic Energy Research Center (ERC), Pusan National University, Busan, Republic of Korea

PS1-218 **Dynamic Hydroxo-Complexation in Mixed Ionic–Electronic Conductors for High-Performance Wearable Organic Thermoelectric Devices**
Jihyun Kim, Hyeonsu Choi, Kanghyun Jo, Byeonggwan Kim[*]
Chungnam National University, Korea

PS1-219 **Design and Characterization of Easily Synthesizable Electron Acceptors for Polymer Solar Cells**
Jin Geum, Eunhee Lim
Department of Applied Chemistry, University of Seoul, Korea

PS1-220 **Three-Dimensional Integrated Laser Delivery System for Optical Interconnection in Trapped-Ion Quantum Computers**
Hiromu Sato[*], Sahar Alasvand Yazdani[*], Guo-Wei LU[*], and Shiyoshi Yokoyama[*]
[*]Institute for Materials Chemistry and Engineering, Kyushu University, Japan

PS1-221 **PEDOT:PSS-Based Protection Layer via Transfer Printing for Dendrite-Free Lithium Metal Electrodes**

Yewon Park, Heeji Jeon, Minseok Jung, Tsolmonbaatar Dulguun, Jeonghun Kim
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

PS1-222 **Multifunctional Separators Based on Organic Conductive Polymers for Interfacial Stabilization in Lithium Metal Batteries**

Hongjun Jang, Minseok Jeong, and Jeonghun Kim
Department of Battery Engineering, Yonsei University, Korea
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

PS1-223 **Enhanced High-Rate Reversibility of Carbon-Lean Ni-Rich Cathodes through a Uniform Polymeric Conductive Network**

Seongju Park, Minseok Jeong, Tsolmonbaatar Dulguun, Jeonghun Kim
Yonsei University, Korea

PS1-224 **In-situ AI Analysis of Single-Molecule Bridging Dynamics in Electroless Gold Plating (ELGP) Nanogap Electrodes**

Masashi Mitoma[1+], Seiichiro Izawa[1], Kotaro Kajikawa[2], Ryo Shintani[3], and Yutaka Majima[1*]
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PS2-050 **Ion-Conductive and Electron-Modulating Artificial Interphase for Dendrite-Free Zinc Anodes**

Minjae Kim, Siyeon Lee, Jeongmin Lee, Jonghun Shin, Heejin Koo, Eunseo Noh, Kyungjin Kim, Jaemin Lim, Seoung Ho Lee, Haesun Park, Kwan Woo Nam and Byoung Hoon Lee
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PS2-052 **Visualizing the Charge Carrier Dynamics in Donor-Acceptor Heterostructure Organic Semiconductor Films via fs-Transient Absorption Microscopy**

Wookjin Chung[1], Yongjoon Cho[2], and Jooyoung Sung[1]
[1]Department of physics and chemistry, DGIST, Korea
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PS2-054 **Optical Response and Photoluminescence Enhancement in Ag Nanocube-Based Plasmonic Nanostructures**

Yua Imai, Takayuki Kiba, Midori Kawamura
Graduate School of Engineering, Kitami Institute of Technology, Japan

PS2-055 **Fabrication of Mg Nanostructures by Nanosphere Lithography and Evaluation of Their Optical Properties**

Keigo Yoshida, Taisei Kumeta, Sheng Peng, Takayuki Kiba, Midori Kawamura
Division of Applied Chemistry, Kitami Institute of Technology, Japan

PS2-056 **Enhancing Ductility of Poly(butylene succinate) Copolyesters through BHET Incorporation**

Sang Uk Park, Bun Yeoul Lee
Department of Molecular Science and Technology, Ajou University, Korea

PS2-057 **Structural Dependence of Photoluminescence Enhancement in Ag Nanocavity Structures with an Ultrathin MgO Spacer**

Koki Kanemitsu, Shota Takahashi, Sheng Peng, Takayuki Kiba, Midori Kawamura
Division of Applied Chemistry, Kitami Institute of Technology, Japan

PS2-058 **Spectroscopic Investigation of Interfacial Electron Extraction and Recombination at Azaacene-Based ETLs in Perovskite Solar Cells**

Yeon-Ji Shin, Suchan Gong, JaeHong Park, Won-Suk Kim
Department of Chemistry and Nanoscience and Institute for Multiscale Matter and Systems (IMMS), Ewha Womans University, Korea

PS2-059 **Effects of Sulfur Doping and UV-Induced Structural Modification on the Organic Dye Decomposition Performance of Graphitic Carbon Nitride Photocatalysts**

Sei Maeyama[1], Yuji Hara[1], Shuhei Shimoda[2], Keita Suzuki[3], Kiyotaka Nakajima[2], and Tomoya Takada[1]
[1]Department of Applied Chemistry and Bioscience, Chitose Institute of Science and Technology, Japan
[2]Institute for Catalysis, Hokkaido University, Japan
[3]Laboratory of XPS Analysis, Faculty of Engineering, Hokkaido University, Japan

PS2-060 **Organic–Inorganic Hybrid Binder Design for Water-Resistant Cold-Bonded Iron Ore Pellets**
Hayoon Cho, Young-up Jin, Won-Ki Lee*
Division of Applied Chemical Engineering, Pukyong National University, Busan, Korea

PS2-065 **Anthraquinone-based Multifunctional Additive for Efficient Defect Passivation and Enhanced Electronic Coupling in High-Performance Perovskite Solar Cells**
Gayeon Yoon, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-066 **Strong Interfacial Coupling of a Self-Assembled Monolayer Enables Stable and Efficient Lead-Free Near-Infrared Perovskite Light-Emitting Diodes**
JaeYeon Yi, Jae Woong Jung
Departments of Advanced Materials Engineering, Kyung Hee University, Korea

PS2-067 **Coumarin: A multifunctional organic dye for stabilizing grain boundaries and defects in perovskite films for high-performance solar cells**
Gihyeon Ku, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-069 **Reproducible Two-Step Synthesis of Poly(3-hexylthiophene) in a Flow Reactor**
Jayun Choi, Ye-Jin Hwang
Department of Chemical Engineering, Inha University, Korea

PS2-070 **Deep-Energy-Level Anthraquinone Monolayers: Tailoring the Interface for Efficient Deep-Blue Perovskite Electroluminescence**
Chang Yeol Lee, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-071 **Large-Area All-PEDOT:PSS Organic Electrochemical Transistors Enabled by Bar-Coating-Assisted Sulfuric Acid Treatment**
Hyeonjun Na, Ji Hwan Kim, Da-Young Lee, and Myung-Han Yoon
Gwangju Institute of Science and Technology (GIST), Korea

PS2-073 **Machine Learning-Guided Solvent Screening and Phase Engineering of Quasi-2D Perovskites in Sustainable Solvent Systems for High-Performance Solar Cells**
Ammarah Razzaq[1], Jae Woong Jung[1*]
[1]Department of Advanced Materials Engineering, Kyung Hee University, Korea

PS2-074 **Flow Synthesis of Poly(benzimidazobenzophenanthroline) (BBL) for Molecular Weight Control and Improved Reproducibility**
Aram Jeong, Gyeongseo Kim, Ye-Jin Hwang
Department of Chemistry and Chemical Engineering, Inha University, Korea

PS2-076 **Hybrid Flame Retardant System of Inorganic and Phosphorus-Based Additives in Polyurethane Foams for Electric Vehicle Battery Insulation Pads**
Seong-Guk Bae, TaeWon Shin, Jung-Soo Kim, Woong Kim, Deukjoo Park and Won-Ki Lee
Elastic Material Research Group, Korea Institute of Materials and Convergence Technology, Busan, Korea
Department of Polymer Engineering, Pukyong National University, Busan, Korea

PS2-077 **Surface engineering of freeze-dried casein porous materials toward sustainable sensing material**

Kento Kojiro[1], Misuzu Kitajima[2], Kanta Tsurusaki[2], Asami Ohtake[3], Koichi Sakaguchi[2]
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PS2-078 **Electronic Properties and Carrier Transport of Reduced Polyoxometalate-Ferrocenium Salt**

Naru Tatebe[1], Tetsu Sato[1,2], Shiori Harada[1], Shun Dekura[1,2], Jumpei Moriguchi[3], Ryo Tsunashima[3], and Tomoyuki Akutagawa[1,2*]
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PS2-079 **Electron Correlation Effects on Excited-State Stabilization in INVEST Emitters: A Computational Study**

Yebin Kim[1], Jiseong Park[2], Seunghoon Lee[2*], and Dongwook Kim[1*]
[1]Department of Chemistry, Kyonggi University, Korea
[2]Department of Chemistry, Seoul National University, Korea

PS2-080 **Variation of FWHM and Emission Energy with the Structure of DABNA-1 Analogues: A Computational Study**

Minjae Ga, Jisu Jeong and Dongwook Kim
Department of Chemistry, Kyonggi University, Korea

PS2-082 **Polar molecular arrangement and physical properties of thin film C8 - BTBT derivatives with fluoroalkyl chain**

Shunki Kashii[1], Tetsu Sato[1,2], Shun Dekura[1,2], Kohei Sambe[1], Kiyoshi Nikasido[3], Yotaro Kasahara[4], Shingo Maruyama[5], Takashi Takeda[6], Tatsuo Hasegawa[3], Yuji Matsumoto[1] and Tomoyuki Akutagawa[1,2*]
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PS2-083 **Quinoxaline-Based Organic Interlayer for Buried Interface Engineering in Wide-Bandgap Perovskite Solar Cells**

Yu Kyung Lee, Dong Wook Chang
Department of Energy and Chemical Materials Engineering, Pukyong National University, Busan, Korea

PS2-084 **Tunable Synaptic Plasticity in Vertical Organic Electrochemical Diodes via Dopant-Ion Size Modulation**

Alexander Tipan-Quishpe, Il-young Jo, Minhu Huang, and Myung-Han Yoon*
Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, Korea

PS2-085 **Molecular Engineering of Non-Fullerene Acceptors for SWIR Organic Photodetectors**

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PS2-086 **A Study on the Electrochromic Characteristics of Polymer Viologen Devices According to Monomers**

Kyung yun Kang[1], Ju Hyeon Lee[1], Seung Woo Lee[1*]
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PS2-087 **Asymmetric Molecular Design of Organic Nonlinear Optical Crystals for Broadband Terahertz Wave Generation**

Haneul Kim, Ga-Eun Yoon, Yu-Jin Park, Chaeyoon Kim, Woojin Yoon, Hoseop Yun, Mojca Jazbinsek, Fabian Rotermund, O-Pil Kwon
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Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), Korea
Department of Chemistry & Department of Energy Systems Research, Ajou University, Korea
Institute of Computational Physics, Zurich University of Applied Sciences (ZHAW), Switzerland

PS2-088 **Anion Engineering in Fluorinated Benzothiazolium Crystals for Efficient Terahertz Wave Generation**

Seungmin Kim, Chae-Won Lee, Chaeyoon Kim, Woojin Yoon, Hoseop Yun, Mojca Jazbinsek, Fabian Rotermund, O-Pil Kwon
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Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), Korea
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PS2-089 **Isomorphic Organic Nonlinear Optical Crystals with Different Counter Anions for Terahertz Generation**

Woo Shin Kim, Jung-Wook Park, Michael Auer, Chae-Won Lee, Ga-Eun Yoon, Yun-Sang Lee, Jeong-A Yang, Woojin Yoon, Hoseop Yun, Uros Puc, Chaeyoon Kim, Fabian Rotermund, Mojca Jazbinsek, and O-Pil Kwon
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Research Institute of Basic Sciences, Department of Chemistry & Department of Energy Systems Research, Ajou University, Korea
Department of Physics, Korea Institute of Science and Technology (KAIST), Korea

PS2-090 **Synthesis of Syn- and Anti-Type Bifacial Truxene with Phosphonic Acid Group and Application to Lead Perovskite Solar Cells**

Taiga Fujiwara[1], Fumitaka Ishiwari[1,2], Ryosuke Nishikubo[1] and Akinori Saeki[1]
[1]The University of Osaka, Japan
[2]Tokyo Metropolitan University, Japan

PS2-091 **Efficient Near-Infrared Organic Photodetectors via Additive Engineering of TBzIC-Based Non-Fullerene Acceptors**

Nahyeon Lee, Geontak Bae, Honghyeon Park, Jong-Woon Ha, Seunghyun Rhee*, Jaewon Lee*
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PS2-092 **New Organic Nonlinear Optical Crystals with Orthogonal Cation-Anion Dipole Coupling for Broad Terahertz Generation**
Jiwon Yoo, Yun-Sang Lee, Chaeyoon Kim, Jungkwon OH, Woojin Yoon, Hoseop Yun, Mojca Jazbinsek, Fabian Rotermund and O-Pil Kwon
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Department of Chemistry & Department of Energy Systems Research, Ajou University, Korea
Institute of Computational Physics, Zurich University of Applied Sciences (ZHAW), Switzerland
Department of Physics, Korea Institute of Science and Technology (KAIST), Korea

PS2-094 **Understanding Transient Ion Transport in Ionogel-Based Organic Electrochemical Synaptic Transistors**
Heewon Yang[1], Joohyun Lee[1], Youngseok Kim[2], and Felix Sunjoo Kim[1]
[1]Department of Chemical Engineering, Chung-Ang University, Korea
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PS2-095 **Electro-Steric Ion Confinement in Polyelectrolyte Networks for Robust Nonvolatile Artificial Synapse**
Jinbo Kim, Jeonghun Kim
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

PS2-096 **Molecular Engineering of Alkyl Side Chains for High-Performance Naphthalenediimide Polymer Cathodes**
Soyoung Kim, Wonho Lee
Department of Polymer Science and Engineering, Kumoh National Institute of Technology, Korea

PS2-097 **Layer-by-Layer-Assembled Polymer Capsules for Electron Transfer-Driven Lactate Sensing**
Gyuwon Hong, Dong Hoon Lee, Taek Seung Lee
Department of Applied Organic Materials Engineering, Chungnam National University, Korea

PS2-098 **High-Spatial-Resolution Optical Pressure Sensing Using Chiral-Nematic Liquid Crystal Polymer Particles**
Maki Ogata, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-099 **Control of Internal Orientational Structures in Chiral Nematic Liquid Crystal Polymer Microparticles via Interfacial Anchoring**
Teppei Yokoyama, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-101 **Synthesis of a Conjugated Polymer Photocatalyst and Evaluation of Its Photocatalytic Dye Degradation Performance**
Yunseo Cho and Taekseung Lee*
Department of Organic Applied Materials Engineering, Chungnam National University, Korea

PS2-102 **Polymer Electrochromic Displays with Transparent Capacitive Ion Storage Layers**
Seungwon Lee, Inho Song
Chung-Ang University, Korea

PS2-103 **Photochromic Spiropyran-Functionalized Mesoporous Silica for Optochemical Metal Ion Sensing**
Sung Soo Park
Department of Polymer Nano Engineering, Dong-Eui University, Korea

PS2-104 **Dielectric Additive Enables Humidity-Independent Preparation of Blend Morphology for High-Performance, Large-Area Organic Photovoltaics**
Sungmin Park[1], Seongwon Yoon[2], Myungchan An[1], Jaeyun Kim[1], Taehyeon Yun[1], Hae Jung Son[2*]
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PS2-105 **Plasticizer-Free Chiral-Nematic Liquid Crystal Elastomers with Room-Temperature Mechanochromic Responses**
Ryo Ishida, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-106 **Synthesis of Crosslinked Chiral Nematic Liquid Crystal Polymer Microparticles Employing Liquid Crystal Crosslinkers**
Shunya Yamada, Bag Samrat Kumar, Kazuki Kawai, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-107 **Bisthienylbutadiene diimide (BTBI) Based Donor-Acceptor Conjugated Polymers: Tuning Energy Levels for OECT Performance**
Hyejun Park, Seungjin Song, Joohyun Lee, Felix Sunjoo Kim
Department of Chemical Engineering, Chung-Ang University (CAU), Korea

PS2-108 **Low-Temperature Strength Development in Iron Ore Pellets Using a Water Glass-Moisture Curable Hybrid Binder**
Aniket B. Gole[1], Hayoon Cho[1], Young-Woo Kim[2], Won-Ki Lee[1]
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PS2-109 **Systematic Tuning of Energy Levels in EDOT-based D-A-D Monomers via Acceptor Engineering**
Joohyun Lee, Seungjin Son, Felix Sunjoo Kim
Chung-Ang University (CAU), Korea

PS2-110 **Evaluation of photocatalytic activities of graphitic carbon nitride and chalcogenide composites**
Fumiaki Iitaka, H. Ogata
Graduate School of Science and Engineering, Hosei University, Tokyo, Japan

PS2-111 **Novel Crosslinked Soluble Polyimide as a Gate Insulator for High Performance Organic Thin-Film Transistors**
Chae Yeong Lim and Taek Ahn
Department of Applied Chemistry, Kyungsung University, Korea

PS2-112 **Electrolyte-Gated Transistors based on Bio-based Electrolyte Components**

Donggyu Wi, Junmin Lee, Alem Araya Meresa, and Felix Sunjoo Kim*
Department of Chemical Engineering, Chung-Ang University, Korea

PS2-113 **Optical Properties of Electron-Beam-Patterned Ag Nanohole Array Electrodes and Their Applicability to OLEDs**

Taishin Yasunaga[1], Keisuke Ikeda[1], Takayuki Kiba[1], Midori Kawamura[1], and Akio Higo[2,3]
[1]Division of Applied Chemistry, Kitami Institute of Technology, Japan
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PS2-114 **Evaluation of Photocatalytic Activity of Graphitic Carbon Nitride Composites for the Degradation of Organic Pollutants**

Hironori Ogata, Yusuke Kadota, Fumiaki Iitaka
Graduate School of Science and Engineering, Hosei University, Japan
Department of Chemical Science and Technology, Hosei University, Japan
Research Center for Micro-Nano Technology, Hosei University, Japan

PS2-115 **Enhancing visible-light harvesting of Pt-loaded TiO_2 through conjugated polymer integration**

Younghun Kim, Taek Seung Lee
Department of Organic Applied Materials Engineering, Chungnam National University, Korea

PS2-116 **Highly Crystalline Bisthienylbutadiene Diimide (BTBI)-based Copolymers for n-Type Organic Field-Effect Transistors**

Seungjin Song, Donguk Kim, Ye-jin Hwang, Felix Sunjoo Kim
Department of Chemical Engineering, Chung-Ang University (CAU), Korea
Department of Chemical Engineering, Inha University, Korea

PS2-117 **Cross-Linked Polyimide Gate Dielectric through Thermal Click Chemistry for Low Temperature Processable Organic Thin Film Transistor**

Chae Yeong Lim and Taek Ahn
Department of Applied Chemistry, Kyungsung University, Korea

PS2-118 **Dimensional and Morphological Evolution of Quinone–Benzimidazole COFs via Out-of-Plane Stacking Control**

Chae Wan Park, Taek Seung Lee
Department of Organic Applied Materials Engineering, Chungnam National University, Korea

PS2-119 **Modulation of Dielectric Properties and Molecular Assembly Structures via Photoisomerization of tert-Butylcamphorquinoneimine**

Manato Sato,[1] Shun Dekura,[1,2] Tetsu Sato,[1,2] Yotaro Kasahara,[3] Ryo Tsunashima,[4] Jumpei Moriguchi,[4] Shiori Harada,[1] and Tomoyuki Akutagawa[1,2]
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PS2-120 **Cyclo-aliphatic CHMA-incorporated Tackifier : A Viscoelastic-Tuning Strategy for Robust Optically Clear Adhesives**

Gyeong Tae Nam, Suk-Min Hong, Hyuck-Jin Kwon, Jun Hwang, Yu Na Jeong, Se Hui Jo, Chil Won Lee
Dankook University, Cheonan, Korea

PS2-121 **Tert-Butyl-Substituted Carbazole-Based Hosts for Electrochemically and Morphologically Stable Blue PhOLEDs**

Da Gyum Huh, Hyun Woo Kim, Hye Rim Lee, Jun Hwang, Yeong Jun Lee, Chil won Lee
Dankook University, Cheonan, Korea
Dankook University, Jukjeon, Korea

PS2-122 **A design strategy of N-type host for suppressing exciton induced degradation in PhOLEDs**

Hyunwoo Kim, Yeong Jun Lee, Jeong Yeol Yoo, Hye Rim Lee, Chil Won Lee
Department of Chemistry, Dankook University, Korea
Department of Polymer Science and Engineering, Dankook University, Korea
Next-Generation Display Innovation Convergence Open Sharing System, Dankook University, Korea

PS2-123 **Hierarchical Photonic Structures in Chiral Nematic Liquid Crystal Polymer Microparticles via Polymerization Rate Control**

Rina Tanigawa, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-124 **Entropy-protected stabilization of multiple-resonance emitters for long-lived deep-blue OLEDs**

Sinyeong Jung[1], Daisuke Baba[2], Hiroyuki Tanaka[2], Masahiro Hayakawa[1], Jiping Hao[1], Yasuhiro Kondo[2], Masakazu Kondo[3], Takuji Hatakeyama[1]*
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PS2-125 **Single-Component CPL-Sensitive Photodiodes Enabled by Light-Induced Chirality in a Conjugated Polymer**

Junho Bae, Inho Song
Chung-Ang University (CAU), Korea

PS2-126 **Regioselective Fluorination of Thiophene-Based Building Blocks for Organic Semiconductors**

Donghyeok Yun, Minjun Kim
Department of Chemistry, Kyonggi University, Korea

PS2-127 **Machine-Learning Prediction of Helical Twisting Power for Stereogenic-Centre-Based Dopants in Chiral Nematic Liquid Crystals**

Yuto Ueda, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-128 **Polarization Voltage Lowering of Ferroelectric PVDF-TrFE films by Oxide Buffer Layers**

Minuk Kim[1] and Felix Sunjoo Kim[1]*
Department of Chemical Engineering, Chung-Ang University, Korea

PS2-129 **Two-step electrical response in novel class of dumbbell-shaped plastic crystal**

Chisato Sato[1], Shun Dekura[1,2], Tetsu Sato[1,2], Tomoyuki Akutagawa[1,2*]
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PS2-130 **Moisture-Triggered Reconfigurable Perovskite Crystallization for Air-Processed Perovskite Solar Cells**
Ki Tae Kim, Jae Hyeok Song, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-131 **Multifunctional L-Cysteine Passivation for Efficient and Stable Deep-Blue Perovskite Light-Emitting Diodes**
Je Yeol Ryu, Jae Hyeok Song, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-132 **Positional Effects of Peripheral Spirofluorene Substitution in MR-TADF Emitters**
SuAh Park, Yu Na Jung, Se Hui Jo
Department of Chemistry, Dankook University, Cheonan, Korea
Department of Polymer Science and Engineering, Dankook University, Cheonan, Korea

PS2-133 **Preparation and Characterization of PVDF-based Copper(II) Chloride Hydroxides and Graphene Oxide Composites for Solar Cells**
Yung Hun Kim, SeongJun Lee, and Mi-Ra Kim*
Dong-Eui University, Korea

PS2-134 **Donor Engineering of Blue MR-TADF Sensitizers for Blue OLED Devices**
Bong Gyun Jang, Yeong Jun Lee, Da Gyum Huh, Gyeong Tae Nam
Department of Chemistry, Dankook University, Korea
Department of Polymer Science and Engineering, Dankook University, Korea
Next-Generation Display Innovation Convergence Open Sharing System, Dankook University, Korea

PS2-135 **Surface Modification of Diatomite Using Silane Coupling Agents and Evaluation of Particle Interactions**
Asaka Iwai, Atsushi Hyono, Naoya Enomoto, Koshiro Kubo and Keiichiro Abe
National Institute of Technology (KOSEN), Asahikawa College, Japan
National Institute of Technology (KOSEN), Ariake College, Japan

PS2-136 **Characteristics of n-Type BBL Field-Effect Transistors Made of Different Processing Conditions**
Hyung Jun Ju, Felix Sunjoo Kim
Department of Chemical Engineering, Chung-Ang University, Korea

PS2-137 **Organic/Inorganic Hybridization of Conducting Polymer Composites through Post-Deposition Treatment with Sol-Gel Precursors**
Seojin Baek, Heewon Yang, Kyubin Kim, Junmin Lee, Chaesun Jeong, Youngseok Kim, and Felix Sunjoo Kim
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[2]Young Engineering Science, Gyeryong, Chungnam, Korea

PS2-138 **Poly(amic acid) Based Hydrogels with Ethylene Oxide Segments for Ion-Conducting Flexible Devices**
Ju Hyeon Lee, Kyung Yun Kang and Seung Woo Lee
School of Chemical Engineering, Yeungnam University, Korea

PS2-139 **Intrinsic Chirality in a p-type Polymer Enables Circularly Polarized Light-Sensing Artificial Synapses in Organic Electrochemical Transistors**
Yuseok Song, Hyunwoo Song, Chaeeun Hyun, Inho Song
Chung-Ang University, Korea
Seoul National University, Korea

PS2-140 **Broadening the Doping Process Window of Polymeric Hole-Transport Layers for Reliable Perovskite Solar Cells**
Sanghoon Lee, Minjun Kim
Department of Chemistry, Kyonggi University, Korea

PS2-141 **Phosphorylcholine-Modified Nickel Oxide Enables Reconfigurable Perovskite Crystallization for Efficient Pure-Blue Perovskite Light-Emitting Diodes**
Hyeon Uk Kang, Jae Hyeok Song, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-142 **Benzylphosphonic acid reconstructs the buried ITO/NiOx interface and the NiOx/perovskite interface simultaneously**
Heo Won Seok, Jae Hyeok Song, Jae Woong Jung
Department of Materials Science and Engineering, Kyung Hee University, Korea

PS2-143 **Performance enhancement of perovskite light-emitting diodes via ultraviolet–ozone oxidative treatment of polymeric hole transport layers and its mechanism investigation**
Reiko Yamauchi[1], Zhanglin Guo[1,2,3], Toshinori Matsushima[1,2,3,4*]
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[3]Department of Automotive Science, Graduates School of Integrated Frontier Sciences, Kyushu University, Japan
[4]Department of Applied Chemistry, Faculty of Engineering, Kyushu University, Japan

PS2-144 **Concentration-Tunable White-Light Emission and Maskless Photopatterning of Azide-Crosslinked Donor–Acceptor Conjugated Polymers**
Jaedoo Nam and Jongho Kim*
Department of Textile System Engineering, Kyungpook National University, Korea

PS2-145 **Photovoltage-Gated Transfer Modulation in a Solution-Gated Organic Phototransistor Using a Plasmonic OSC**
Tianshuo WANG[1], Layheng Chea[1], Reaksmey Ek[1], Masahiro Minagawa[2], Sachiko Jonai[1], Yasuo Ohdaira[1], Akira Baba[1], and Kazunari Shinbo[1*]
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PS2-146 **Aggregation Structure Control of Rod-like Luminescent Gold(I) Complexes Bearing Oligoethylene Oxide Chains**
Moe Mizobata, Kohsuke Matsumoto, Osamu Tsutsumi
Department of Applied Chemistry, Ritsumeikan University, Japan

PS2-147 **Fabrication of durable nanopillars surface on stainless steel using plasma etching and nitriding process**

Mitsuhiro Hirano[1], Keita Kitazawa[1], Kai Koiima[1], Nozomu Kuraoka[1], Naofumi Ohtsu[1]
[1]Faculty of Engineering, Kitami Institute of Technology, Japan

PS2-148 **Raman Mapping Using Ag Cluster-Decorated Polystyrene Particles as Localized SERS Probes**

Atsushi Hyono, Kokoro Ohno, Mai Takase, Takashi Endo, Keita Suzuki, Shigeaki Abe, Naoya Enomoto
National Institute of Technology, Asahikawa College, Japan
Muroran Institute of Technology, Japan
Hokkaido University, Japan
Kitami Institute of Technology, Japan
National Institute of Technology, Ariake College, Japan

PS2-149 **Development of sol-gel transition composite materials controlled by infrared irradiation**

Yining Hu, Lin Sheng, Teng Ge, Qi Yin, Jianfei Zhu, Alireza Valanezhad, Atsushi Hyono, Yuko Eea, Shigeaki Abe, Mariko Nakamura, Ikuya Watanabe, and Tomoya Takada
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Memo

Program book with abstracts: https://www.kjf-icomep.org/kjf/down/KJF2026_Program-Abstract.pdf

Abstracts

Plenary Lectures

PL-1

Charge Coherence in Self-assembled Organic Molecular Semiconductor Quantum-wells

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This presentation focuses on establishment of charge coherence in two-dimensional solution-processed organic single crystals, which is linked to high-performance transistors with mobility exceeding 10 cm^2/Vs at room temperature [1]. Very clean metallic state is also achieved with high-density holes in the same system, so that a scalable quantum electronic materials is presented.

A method of continuous crystallization from solution using a meniscus is developed to grow a-few monolayer crystal films to the size of 30 cm x 30 cm [2,3]. The ultrathin organic semiconductor single crystalline films of a p-type organic semiconductor alkyl-naftobenzodithiophene (Cn-DNBDT) are easily grown from solution to the wafer scale at temperatures around 80 ^oC on a film substrate [3]. With excellent chemical and thermal stability in such materials, integrated devices are developed based on organic CMOS processing technologies.

Employing the molecule composed of an elongated π-electron core and σ-electron units connected to both edges of the core, a quantum well is formed. Upon doping, the 2D crystal layer of the π-electron core is protected from the anions, resulting in the first metallic phase in organic semiconductors [5]. The mobility exceeds 100 cm^2/Vs at 2 K with uniaxial strain and a quantum oscillation appeared at 100 mK.

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[4] T. Sawada, S. Watanabe, J. Takeya et al., Nature Commun. 11, 4839 (2020).
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Jun Takeya is a professor in Department of Advanced Materials Science, Graduate School of Frontier Sciences, University of Tokyo from 2013 and is jointly appointed for an honored visiting researcher in National Institute for Material Science from 2017. He is also CTO of Pi-Crystal Inc. from 2013 and Organo-Circuit Inc. from 2016 both of which are start-ups founded on his scientific achievement in organic electronics. He received the B.S. degree in 1989, the M.S. degree in 1991, and Ph.D. degree in 2001 from the University of Tokyo, Tokyo, Japan, all in physics. He was a research scientist in Central Research Institute of Electric Power Industry, from 1991 to 2006, a visiting researcher in ETH, Zurich, Switzerland, from 2001 to 2002, a visiting researcher in RIKEN, Japan, from 2005 to 2006, a visiting associate professor in IMR, Tohoku University, Japan, from 2005 to 2006, and an associate professor in Graduate School of Science, Osaka University, Osaka, Japan, from 2006 to 2010. He was a professor in the Institute of Scientific and Industrial Research, Osaka University, Osaka, Japan, from 2010 to 2013.

PL-2

Light Conversion for Photocatalysis and Photodynamic Therapy Using Organic Conjugated Polymer-Inorganic Hybrid Materials

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Considerable attentions on semiconducting organic materials have been attracted for various applications such as optoelectronic devices, multimodal imaging, and biomedical medicine. The semiconducting polymers usually maintain their conjugated structure for high quantum yields, good photostability, and excellent charge transfer property and, thus have opened a new horizon for interesting applications. These versatile applications of semiconducting polymers mainly based on the light-converting ability, enabling light conversion to light, to electron movement, and to heat. The generated light can be applied to solid-state lighting such as OLED; the generated electrons are useful for energy applications such as water-splitting and all-solid-state Li-ion battery; the generated heat is used for cancer therapy and for water evaporation to obtain pure water. New, versatile semiconducting polymer-based, hybridized materials with effective conversion properties will be demonstrated.

Taek Seung Lee is a professor of Chungnam National University (1997–present). He received his B.S. degree from Seoul National University in 1988, M.S. degree in 1990, and Ph.D. degree in fiber and polymer science from the same university in 1994. Following his doctoral studies, he did his postdoctoral research at Korea Institute of Science and Technology, and University of Massachusetts Lowell (1995-1997). His research interests focus on functional materials, including conjugated organic and polymeric materials, inorganic materials, and organic–inorganic hybrid materials. He was a President of the Korean Fiber Society in 2024 and President-Elect of the Polymer Society of Korea in 2026.

Abstracts

Invited Lectures

IL-01

Memtransistors Using Organic-Semiconductors/MoS_2 Heterostructure for Neuromorphic Electronics

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Memtransistors (MTs) using organic/inorganic semiconductors represent promising gate-tunable and energy efficient synaptic architecture for neuromorphic electronics. In this study, a vertically stacked heterostructure (HS) consisting of organic-semiconductor tris(4-carbazoyl-9-ylphenyl)amine (TCTA) donor and MoS_2 acceptor was designed through type-II energy band engineering and used for active layer of bottom-contact (BC) field-effect transistors (FETs). [1] Memristive switching with SET and RESET hysteresis in $V_G < V_{th}$ regime was realized through low-conducting and high-conducting states with a switching ratio of 10^2, modulated by gate biases/pulses, interpreting as trap-related space charge limit current. The MTs successfully mimicked hetero/homo synaptic functions via tunable and non-volatile changes in post-synaptic current in response to electrical stimuli, with the drain, source, and gate terminals functioning as pre-, post-, and modulatory-neurons. Measured current vs. voltage transfer and output characteristics at various gate biases/pulses clearly demonstrated polarity-dependent synaptic behavior, consistent with heterosynaptic long-term plasticity, highlighting the capability of emulating neuromodulated heterosynaptic plasticity. Applying gate-pulse only, analogous responses were observed in synaptic modulation with time constants of 100 ms for potentiation and 60 ms for depression. Similar behaviors were observed for the $Ir(ppy)_3/MoS_2$-based MTs. This work highlights the potential of designed organic/inorganic-semiconducting HSs for MTs in promoting reliable neuromorphic electronics.

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Google Scholar; H-index 60, Citations 15900

IL-02

Development and Catalyzed Doping of n-Type Polymer Semiconductors

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The advance of organic electronics relies on the design and synthesis of high-performance p-type and n-type organic/polymer semiconductors with comparable device performance. However, the device performance of n-type polymers lags far behind their p-type counterparts, hence limiting the advance of organic electronics. The development of high-performance n-type polymer semiconductors hingers on the design and synthesis of highly electron-deficient building blocks with small steric hindrance, planar backbone, compact geometry, and good solubility. In this talk, I will present a series of imide-functionalized ladder-type bithiophene imide (BTI) derivatives with up to five imide groups, and the polymer semiconductors built from them show remarkable performance in various n-type organic (opto)electronic devices. On another hand, chemical doping is a fundamental tool for tuning charge carrier density, Fermi level, and electrical conductivity of organic semiconductors and improving (opto)electronic device performance. However, n(electron)-doping is much more challenging than p(hole)-doping and typically achieves a much lower doping efficiency. I will discuss our discoveries on catalyzed molecular n-doping technique based on various catalysts, including vapor deposited transition metal nanoparticles, solution-processable surface-functionalized transition metal nanoparticles, and soluble organometallic complexes.

[1] S. Gámez-Valenzuela, *et al.*, *Nat. Commun.* **16**, 11096 (2025)
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[3] K. Feng, *et al.*, *Acc. Chem. Res.* **54**, 3804 (2021)

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IL-03

Precise Structural Control of Donor–Acceptor Copolymers for Organic Electronics

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Achieving high performance and reproducibility in organic electronic devices requires precise control of semiconducting polymer structures across multiple length scales, from the molecular level to the mesoscale. In this presentation, we highlight our recent efforts to elucidate and control structural factors that govern the electronic properties of donor–acceptor copolymers.

We recently identified deviations from the ideal 1:1 donor-to-acceptor (D) unit ratio as a key origin of batch-to-batch variations in polymer-based organic solar cells (OSCs). To quantify these deviations, we developed a highly accurate X-ray photoelectron spectroscopy (XPS) method calibrated using well-defined small-molecule acceptors, Y6 and BTP-eC9, to refine relative sensitivity factors. Application of this method to donor polymers such as PM6 and D18 revealed that commercially available PM6 often contains excess acceptor units, with deviations reaching 6–7%. These imbalances are attributed to homocoupling during polymerization and symmetric end groups. Polymer batches with larger deviations exhibited broader HOMO density of states in photoemission yield spectroscopy, indicating increased energetic disorder and correlating with reduced open-circuit voltage and fill factor in OSCs. These findings establish a quantitative link between chemical precision, electronic disorder, and device performance. [1]

We also investigated the effects of main-chain sequence defects on charge transport in bithiophene–quinoxaline (BTQ) copolymers. Comparison of polymers synthesized by conventional heterocoupling and defect-free one-pot Stille homopolymerization showed that eliminating sequence defects enhances backbone ordering, crystallinity, and narrows the HOMO density of states, as confirmed by MALDI-TOF mass spectrometry, UV–vis absorption, PYS, UPS, and GIWAXS. Organic field-effect transistors based on defect-free BTQ exhibited hole mobilities 3.5 times higher than those of defect-containing analogues. These results demonstrate that precise control of monomer ratio and sequence regularity is essential for revealing and optimizing the intrinsic electronic properties of π-conjugated polymers.

[1] Nakano, K.; Kaji, Y.; Suzuki, R.; Tajima, K. *Commun. Mater.* **2025**, *6*, 37.
[2] Jung, H.; Nakano, K.; Tajima, K. *ACS Appl. Mater. Interfaces* **2025**, *17*, 66980.

Keisuke Tajima received his Ph.D. from the University of Tokyo and completed postdoctoral research at Northwestern University. After serving on the faculty at the University of Tokyo, he joined RIKEN CEMS as a team leader in 2013. His research focuses on designing organic and polymeric materials for organic electronic devices, particularly polymer solar cells, and on controlling nanostructures and molecular interfaces through molecular self-assembly.

IL-04

Organic Solar Cells with Metal-Semiconductor-Metal Structure

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In high-performance organic solar cells (OSCs), electron transport layers (ETLs) and hole transport layers (HTLs) play critical roles in facilitating efficient extraction and transport of charge carriers from the photoactive layer to the corresponding electrodes. However, the incorporation of ETLs and HTLs introduces additional complexity and remains a key challenge in OSC research. In this study, we present a fabrication strategy that eliminates both ETL and HTL, enabling structural simplification while preserving high performance through simple interfacial modifications at the active layer–electrode interfaces.[1] To realize a Metal-Semiconductor-Metal (MSM) architecture without ETL and HTL, we explored three approaches: Type-I employed a self-assembled monolayer (SAM) at the anode interface and a salt-based interlayer at the cathode; Type-II utilized distinct salt-based treatments at both anode and cathode interfaces; and Type-III involved co-depositing hole-transport-capable molecules with the active layer to spontaneously form a hole-extraction interface, while modifying the cathode with amine salts for efficient electron collection. All three approaches successfully produced high-performance MSM-type OSCs, achieving power conversion efficiencies exceeding 18%, comparable to those of conventional devices employing ETLs and HTLs. These results demonstrate that device complexity can be substantially reduced without compromising performance, suggesting a practical pathway toward more scalable and manufacturable organic photovoltaic technologies.

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IL-05

Exploration of Next-Generation Solar Cells by Experiment-Based Materials Informatics

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A wave of digital transformation not only propels social service and commercial production, but also reenergizes a method of material science research that has traditionally relied on personal experience/idea, serendipitous findings, and trial-and-error experiments. Machine learning (ML), which makes use of ever-expanding artificial intelligence (AI) technology, provides an alternative path to a target material and broadens the region of chemical spaces explored. We have explored organic photovoltaic (OPV) materials ML-based virtual screening and experimental validation[1−4] and developed an automated robot-embedded measurement system that performs photoabsorption spectroscopy, optical microscopy, and white-light-flash time-resolved microwave conductivity (TRMC).[5] This system is applied to exploration of lead halide perovskite solar cell (PSC) and non-lead solution-processed semiconductors.

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[3] S. Tadokoro, R. Kamimura, F. Ishiwari, A. Saeki, *Digital Discovery* **4**, 3774 (2025).
[4] S. Li, F. Ishiwari, S. Li, Y. Yakiyama, A. Saeki, *Angew. Chem. Int. Ed.* **65**, e18505 (2026).
[5] C. Nishikawa, R. Nishikubo, F. Ishiwari, A. Saeki, *JACS Au* **3**, 3194 (2023).

Akinori Saeki received Dr of engineering in applied chemistry from Osaka University in 2007. He had been an assistant professor at The Institute of Scientific and Industrial Research (ISIR), Osaka University in 2003-2009, an assistant professor (tenure-track) in 2010–2014, and an associate professor in 2014-2019 at the Graduate School of Engineering, Osaka University. He is currently a professor at Graduate School of Engineering, The University of Osaka (2019–present). His research interest is in nanometer-scale dynamics of chemical intermediates in condensed matters such as organic semiconductors, organic liquids, and organic-inorganic hybrid materials.

IL-06

Quinoxaline-Based Organic Interfacial Layers for Perovskite Solar Cells

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Perovskite solar cells (PSCs) have emerged as promising photovoltaic technologies owing to their high power conversion efficiencies, tunable bandgaps, and low-cost fabrication processes. Despite remarkable progress, interfacial defects and charge recombination at material interfaces remain critical challenges limiting device performance and long-term stability. This presentation focuses on quinoxaline-based organic interfacial materials as versatile platforms for interface engineering in PSCs. The unique electron-deficient structure of quinoxaline enables precise molecular design for efficient charge extraction, energy-level alignment, defect passivation, and interface stabilization. Representative quinoxaline derivatives functioning as p-type, n-type, and ambipolar interlayers are discussed, highlighting their roles in enhancing charge transport and suppressing non-radiative recombination. Recent studies have demonstrated that tailored quinoxaline-based materials can significantly improve open-circuit voltage, fill factor, and overall device efficiency while contributing to enhanced operational stability. Furthermore, their structural tunability allows broad applicability across various perovskite device architectures and optoelectronic applications. The presentation also examines current research trends and emerging opportunities for quinoxaline chemistry in next-generation perovskite technologies, including tandem solar cells, indoor photovoltaics, and integrated optoelectronic systems. These findings demonstrate the potential of quinoxaline-based interfacial materials as key components for advancing high-performance and durable perovskite optoelectronic devices.

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[2] H. J. Park, et al., *Small*, **20**, 2404784 (2024).
[3] Y. K. Lee, et al., *Advanced Science*, **12**, 2409088 (2025).

Jaewon Chang is a Professor in the Department of Energy and Chemical Materials Engineering at Pukyong National University, Republic of Korea. He obtained his B.S. and M.S. degrees in Fiber and Polymer Engineering from Seoul National University and received his Ph.D. in Materials Engineering from the University of Dayton, USA, under the supervision of Prof. Liming Dai. His current research interests include the molecular design and synthesis of organic semiconducting and conductive materials for sustainable energy technologies, particularly solar cells, energy storage devices, and emerging optoelectronic applications. Please note that he has recently undergone a legal name change. Therefore, his publications and academic records may still be listed under his former name, Dong Wook Chang.

IL-07

Active nanostructures through self-assembly of functional polymers and nanoparticles

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Here, we present two distinct systems exhibiting dynamic changes in structural, optical, and electrical properties. Firstly, we have demonstrated a multitude of responsive colors from a conjugated polymer film, arising from thin-film interference.[1] This mechanism provides excellent control over the thin-film color by varying the film thickness, type of substrate, and degree of polaron population, and exhibit reversible color changes by oxidative or reductive environment with color responsivity controllable with the nature of the polaron state. Secondly, we have adopted a combination of bottom-up DNA-directed self-assembly and top-down photothermal patterning to fabricate free-standing nanoparticle films with vertical and lateral heterogeneity.[2] We demonstrate that this approach provides a powerful means to generate dynamic nanostructures that can undergo complex and programmable shape transformation instructed by the lateral and vertical patterns inscribed in the film as well as the information carried in DNA.

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[2] J. Kim, *et al.*, *Adv. Mater.*, **34**, 2109091 (2022).

So-Jung Park is a professor in the department of chemistry and nanoscience at Ewha Womans University. She obtained her Ph.D. in Chemistry at Northwestern University in 2002 under the guidance of Prof. Chad Mirkin. After postdoctoral research with Prof. Paul Barbara at University of Texas at Austin, she joined the faculty of the department of chemistry at the University of Pennsylvania in the fall of 2005. She then moved to Ewha Womans University as a full professor in 2013. Her current research concerns self-assembly of nanoparticles and functional polymers, focusing on dynamic nanostructures. Her honors include the NSF CAREER Award, the ARO Young Investigator Award, the Camille Dreyfus Teacher-Scholar Award, the Sigma-Aldrich Chemist Award (KCS), and the Presidential Commendation from the Republic of Korea. She was elected to the Korean Academy of Science and Technology in 2026. She is currently serving as an associate editor of ACS Applied Materials and Interfaces and an advisory board member for Nanoscale, Bioconjugate Chemistry, and NPJ Biosensing.

IL-08

Curved π-Electronic Materials Based on Sumanene: From Ultrahigh Dielectric Response to Bright Near-Infrared Emission

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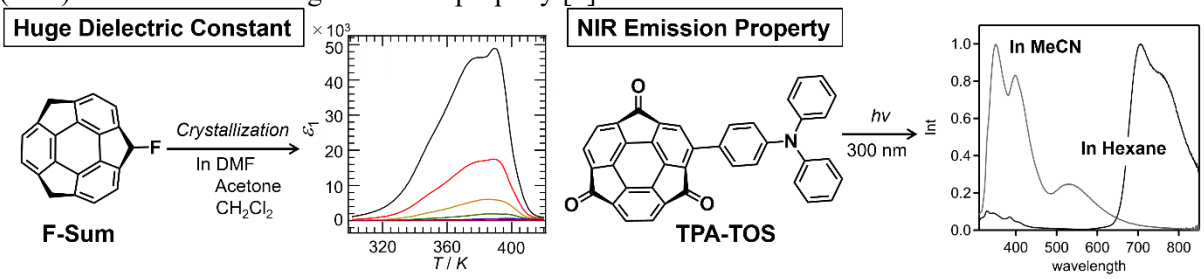
Buckybowls, which are represented by corannulene and sumanene [1], are the partial structures of fullerenes. They are known to show unique physical properties derived from their curved shape. Especially, 1D-column formation ability in the solid state and the bowl flipping nature in the solution state of sumanene attracts great interest in terms of the crystal engineering and the application for molecular switches. Such nature can be controlled by further functionalization at the peripheral carbons, also realizing D-A type materials with curvature. In this presentation, two kinds of electronic materials based on the sumanene (**Sum**) skeleton, realizing huge dielectric constant and strong NIR emission will be introduced.

Fluorosumanenes, which are fluorine-substituted derivatives of sumanene at the benzylic positions, are known to form isostructural crystals with pristine **Sum**, which crystallizes in polar *R*3*c* space group. Our recent studies focusing on **F-Sum**s revealed the anisotropic dielectric nature of di-fluorinated **F2-Sum** crystal induced by its pendulum-like motion in the one-dimensional stacking column [2], as well as the selective preparation of single crystals of mono-fluorinated **F-Sum** showing both low (ε < 10) and ultrahigh (ε > 10000) dielectric constant simply by changing the crystallization solvent [3]. Further investigation of **TPA-TOS**, which is composed of electron-accepting trioxosumanene (**TOS**) bearing triphenylamine (**TPA**) realized the development of highly emissive NIR material (ϕ > 0.66 in hexane), in which both thermally activated delayed fluorescence (TADF) and room temperature phosphorescence (RTP) contributed to its high emission property [4].



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Yumi Yakiyama received her Ph.D degree in 2010 from The University of Osaka. One the way to pursuing her doctorate, she got a JSPS research fellowship (DC2) in 2008. Then she moved to Prof. Masaki Kawano's group in POSTECH (Korea) as a Tae-Joon Park research fellow in 2010, then was appointed a Research Assistant Professor in 2012. In 2015, she joined Prof. Hidehiro Sakurai's group at The University of Osaka as an Associate Professor. Her research interests are in physical organic chemistry and encompass the development of functional organic molecular crystals.

IL-09

CVD based functionalized parylene layer as a flexible gate dielectric for oxide transistors

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Introduction of thin film polymer into specific surfaces has been of special interests in last years, and various methods have been developed so far. Among them, parylene is one of attractive polymeric thin film having thin, pin-hole free, and high-quality characteristics with solvent-less procedure (chemical vapor polymerization). Herein, I would like to introduce functionalized poly-paracyclophane (known as parylene) and their applications especially in potential dielectric or cover layer of stretchable and flexible devices. In particular, the parylene layer having specific organic moiety can not only provide photopatternable dielectric layer (with parylene-OH) but also suggest dielectric layer with tunable dielectric constant via surface treatment through click reaction (with parylene ethynyl).

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IL-10

Organic Semiconductor Photocatalysts for Green Hydrogen Production

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Green hydrogen is a promising carbon-neutral energy carrier, and solar-driven water splitting offers a direct route to convert solar energy into chemical fuel. Organic semiconductor photocatalysts have attracted increasing attention for this purpose because their optical absorption, frontier orbital energies, intermolecular interactions, and nanoparticle formation can be precisely tuned through molecular design.

Although donor–acceptor heterojunctions, co-catalyst anchoring, and surface-charge modulation have substantially improved photocatalytic hydrogen evolution, control over the internal morphology of organic photocatalyst nanoparticles remains a critical challenge. Unlike thin films, aqueous nanoparticles are formed through rapid precipitation under kinetically controlled conditions, often resulting in random aggregation, energetic disorder, and limited exciton/charge transport.
Here, we demonstrate that core alkyl-chain engineering provides an effective strategy to regulate molecular packing within nonfullerene acceptor nanoparticles. This enhanced intraparticle structural order leads to distinct photophysical behavior, including more efficient free-charge generation and a larger population of long-lived electrons. These results establish a direct structure–morphology–function relationship in organic nanophotocatalysts and provide molecular design principles for next-generation solar hydrogen production systems.[1-3]

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Han Young Woo received his Ph.D. in Chemistry from the Korea Advanced Institute of Science and Technology (KAIST) in the Republic of Korea in 1999. After completing postdoctoral training at the University of California, Santa Barbara (UCSB) in the USA, he joined Pusan National University as an assistant professor. In 2015, he moved to Korea University, where he is currently a professor in the Department of Chemistry. His research focuses on the design and synthesis of conjugated polymers and conjugated polyelectrolytes to develop organic and polymer semiconductor materials with tailored optical and electrical properties.

IL-11

Self-Terminating Electroless Gold Plating: A Versatile Nanofabrication Platform for Single-Molecule Electronics and Bioelectronics

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Self-terminating electroless gold plating (ELGP) is a unique nanofabrication technique that enables the creation of metallic nanostructures with nanometer-scale precision through a self-terminating growth process.[1-3] When combined with electron-beam lithography (EBL), this approach offers a versatile platform for constructing both metallic nanogap electrodes and solid-state nanopores for nanoelectronics and single-molecule biosensing.

This presentation highlights recent progress in two key device platforms created using self-terminating ELGP. Heteroepitaxial spherical Au/Pt nanogap electrodes enable consistent formation of single-molecule junctions and gate-controlled single-molecule transistors, which are used to study charge transport through individual molecules.[4] Meanwhile, solid-state Au nanopores made through EBL, MEMS processing, and ELGP provide high signal-to-noise ionic current measurements for label-free detection of single DNA molecules. The talk will also cover recent advances in ELGP nanopore fabrication and electrical measurements aimed at solid-state nanopore DNA sequencing.

These studies demonstrate that self-terminating ELGP offers a standard nanofabrication platform for integrating molecular electronics and single-molecule biosensing, creating a new technological framework for future nanoscale devices.

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IL-12

Mechanistic Insights into Exciplex-TADF in dibenzoylmethane borondifluoride Dyes: Pathways to Efficient rISC

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Boron difluoride-based emitters have emerged as promising building blocks for advanced luminescent materials.[1] Dibenzoylmethane boron difluoride ($dbmBF_2$) derivatives exhibit Thermally Activated Delayed Fluorescence (TADF) either as donor-substituted single molecules[2] or as exciplex-based systems with electron-donating hosts for Organic Light Emitting Diodes (OLED) applications.[3] Exciplex emission is governed by the donor HOMO–acceptor LUMO energy offset, making donor and host engineering effective strategies to tune emission. Building on previous reports of avobenzone–BF_2 exciplex OLEDs,[3] we optimized the $dbmBF_2$ acceptor and investigated host matrices with different triplet energies, polarities, and HOMO levels to improve TADF efficiency.
We synthesized substituted $dbmBF_2$ derivatives bearing different electron-donating groups and studied their photophysical properties in solution and doped films. Depending on the host, emission was tuned from blue (450 nm) to red (620 nm). Remarkably, the emitters displayed room-temperature phosphorescence (RTP) in a PPT host and exciplex TADF in a CBP host. OLEDs fabricated with CBP exhibited green exciplex emission with a maximum external quantum efficiency (EQE) of 15% at 10 $cd.m^{-2}$, while PPT-based devices showed blue RTP with an EQE of 4%. These results demonstrate the versatility of host-controlled emission for efficient OLEDs.

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IL-13

Facilitating the conversion of triplet excitons to singlet excitons in OLED: Computational studies

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Triplet excitons are a major product of charge recombination in organic light-emitting diodes (OLED) and yet remain optically dark for purely organic molecules. In addition, due to their long lifetimes, they are vulnerable to exciton annihilation processes such as triplet-triplet annihilation, triplet-polaron annihilation, etc., which undermine OLED performance. Therefore, the facile conversion of triplet excitons to singlet ones is of utmost interest for improving OLED efficiency.
In this regard, the thermally activated delayed fluorescence (TADF) phenomenon has attracted tremendous attention. To facilitate TADF, swift intersystem crossing (ISC) from the triplet to the singlet excited states, namely reverse ISC (RISC), is imperative. To this end, the spin-orbit coupling (SOC) between these states must be sizable,[1] – a requirement that has received comparatively less attention - while the so-called singlet-triplet energy gap, ΔE_{ST}, remains small.[1-3] In this talk, a viable molecular strategy will be suggested. In multiple resonance (MR) TADF emitters, ΔE_{ST} values are relatively large compared to those of conventional donor-acceptor (D-A) type TADF emitters, raising the question how RISC proceeds in these systems. The distinctive features of the RISC mechanism in MR TADF emitters will also be discussed. [4]

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IL-14

Interparticle Cross-Linking of Perovskite Nanocrystals for Ultrathin Flexible X-ray Detection

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Direct X-ray detectors based on solution-processed semiconductors have attracted increasing attention for next-generation wearable imaging, conformable sensing, and low-dose radiation monitoring. However, achieving efficient charge collection in ultrathin active layers remains challenging because colloidal nanocrystal (NC) solids are typically separated by insulating organic ligands that hinder carrier transport. In this work, I will introduce an interparticle cross-linking strategy for constructing solvent-resistant perovskite NC networks toward ultrathin flexible X-ray detectors. A quaternary ammonium iodide ligand, didodecyldimethylammonium iodide (DDAI), is first employed to partially replace native long-chain ligands and generate chemically accessible NC surfaces. Subsequently, a bifunctional alkyl diamine, 1,12-diaminododecane (DAD), forms interparticle bridges between neighboring $CsPbI_3$ NCs, producing robust and solvent-resistant NC networks. The cross-linked films withstand solvent treatment, enabling the removal of residual insulating ligands while preserving the crystal structure and optical properties of the perovskite NCs. Structural and spectroscopic analyses reveal reduced organic content, denser nanocrystal packing, and a high photoluminescence quantum yield of 71.2%. The resulting cross-linked NC networks enable the fabrication of ultrathin active layers with a thickness of only ~30 nm on flexible substrates. Direct X-ray detectors based on these films exhibit significantly enhanced charge collection and achieve a sensitivity of 22.7 nC Gy^{-1} cm^{-2} under Cu Kα irradiation. Importantly, device performance is governed by efficient carrier utilization enabled by nanoscale network engineering rather than active-layer thickness alone. In addition to X-ray detection, the same NC platform supports visible-light photodetection and deep-red electroluminescence with external quantum efficiencies exceeding 15%, highlighting the multifunctional nature of the cross-linked NC networks.

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IL-15

Organic/Hybrid Thermoelectric Materials and Devices

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Organic thermoelectric materials can directly transform the waste heat into electrical power without causing any pollution, but their development is limited due to poor performance, especially low conductivity. In my talk, we outline the design strategies which aim to develop high-performing organic semiconductors and their materials in organic thermoelectrics. A series of solution-processed organic semiconducting molecules are reported. These results indicate that these materials can be modulated through successive changes in conjugation length/side chain substituent length and molecular interaction based on a combination of molecular design and solution-processing techniques. Doping organic semiconductors, conjugated polymer composites, and gels with ionic salt or redox couples are used to achieve enhanced thermoelectric performance. Flexible/wearable thermoelectric generator based on these materials will be demonstrated.

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Cheng-Liang Liu is a Professor of Materials Science and Engineering at National Taiwan University. He received the B.S. and Ph.D. degrees in Chemical Engineering from National Taiwan University in 2002 and 2007, respectively. He then worked as visiting scientist at the University of Washington from 2005 to 2006, postdoctoral fellow at National Taiwan University from 2008 to 2010, Assistant Professor at Yamagata University (Japan) from 2010 to 2012, Assistant and Associate Professor at National Central University (Taiwan) from 2012 to 2020, before joining National Taiwan University in 2020. His research focuses on organic polymers and hybrid materials for electronic and energy applications, including transistors, memory devices, solar cells, and thermoelectric systems.

IL-16

Organic Electrochemical Transistors: Current Debates and Open Questions

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Organic electrochemical transistors (OECTs) have emerged as promising platforms for bioelectronics owing to their electrochemical doping and mixed ionic–electronic conduction. [1] However, conventional performance metrics based on volumetric capacitance often overestimate doping capability because they do not distinguish electronically active charge generation from non-Faradaic processes. [2] Here, we introduce effective volumetric capacitance as a device-relevant parameter that directly quantifies electronically effective doping. Through operando spectroelectrochemical analysis and molecular simulations, we show that enhanced ion–backbone accessibility enables near-unity doping efficiency, resulting in improved charge transport and high-transconductance OECT operation. These findings establish electronically effective doping as a key design principle for high-performance OECT materials. Building on this framework, we extend the concept to neuromorphic OECTs, where ion trapping governs memory and synaptic behavior. Because conventional memory-window analysis depends strongly on voltage range or scan rate, quantitative comparison across studies remains challenging. [3] To address this limitation, we propose a trap efficiency that quantifies trapped ions relative to injected ions. This metric provides a universal framework for evaluating ion-trapping characteristics across different material and electrolyte systems. Together, these studies establish efficiency-based metrics linking ion transport, charge generation, and ion trapping, providing quantitative design rules for both high-performance and neuromorphic OECTs.

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Dae Sung Chung is currently a professor at the Department of Chemical Engineering at POSTECH. He earned his B.S. and Ph.D. in chemical engineering from POSTECH in 2010. He then worked as a postdoctoral researcher at the University of Chicago until 2012. He began his career at POSTECH in 2020, after holding positions at Chung-Ang University and DGIST. His research focuses on synthetic electronic materials for post-silicon optoelectronic and bioelectronic devices, including image sensors, integrated circuits, organic electrochemical transistors, and hydrogen/oxygen evolution systems. The materials he works with include polymeric semiconductors, organic mixed ionic–electronic conductors, organic molecular switches, and chalcogenide semiconductors.

IL-17

Solvent-Desorption-Induced Superlattice Formation Yielding a High-Performance Porphyrin-Based Organic Semiconductor

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Charge transport performance in organic semiconductors (OSCs) is dictated by their molecular packing motifs, such as 1D slipped stacking, 2D herringbone stacking, and brickwork arrangements. While 2D packing is highly desirable for organic field-effect transistors (OFETs) due to its multi-directional pathways that mitigate structural disorder, accessing novel packing structures remains challenging because conventional crystallization typically yields only thermodynamically favored, equilibrium phases.
To address this limitation, this presentation highlights a remarkable single-crystal-to-single-crystal (SCSC) transformation of 5,15-bisphenyl-tetrabenzoporphyrin (**Ph-BP**), driven by the desorption of intercalated *o*-dichlorobenzene. This process induces a 90° rotation of the π-stacking direction between adjacent layers, yielding a novel ″layered herringbone superlattice″ characterized by a periodic alternation of two distinct herringbone motifs. Notably, this metastable phase can be integrated onto Si/SiO_2 substrates to afford single-crystal OFETs that significantly outperform the conventional equilibrium polymorph in hole mobility. Our discovery demonstrates that solvent-desorption-induced structural transformations offer a sophisticated avenue to unveil hidden, high-performance polymorphs that are otherwise inaccessible.

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Hiroko Yamada received her Ph.D. degree in 1992 from Kyoto University. After the post-doctoral fellows in Argonne National Laboratory, USA (1993), and in Osaka University (1998-2003). She was promoted to an associate professor in Ehime University (2003), and moved to Nara Institute of Science and Technology (NAIST) in 2011. She was promoted to a full professor at NAIST in 2012 and moved to Institute for Chemical Research (ICR), Kyoto University in 2023. In 2006–2010, she was a researcher of PRESTO, JST. Her current research interest is synthesis and morphology control of small molecular organic electronic materials for solution process.

IL-18

Chemically Transformable Side Chains Enabling Multifunctional Conjugated Polymers

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Conjugated polymers have been widely studied as solution-processable organic semiconductors owing to their tunable electronic structures and compatibility with low-cost fabrication techniques. In most conventional designs, however, the side chains are chemically static and primarily serve to improve solubility. This static nature inevitably imposes intrinsic trade-offs between processability, thermal stability, mechanical properties, and ionic/electronic transport, limiting the multifunctionality of conjugated polymer systems.

In this presentation, we introduce a chemically transformable side-chain design strategy that decouples polymer processing from final material functionality. By incorporating side chains that undergo controlled chemical transformation after film formation, polymer properties can be dynamically reconfigured at different stages of processing and operation. We demonstrate that chemical cleavage–induced side-chain shortening leads to a pronounced increase in glass transition temperature and enhanced thermal stability[1]. Furthermore, when polymer films are deposited on elastomeric substrates and subjected to thermal treatment, side-chain transformation induces spontaneous wrinkling structures, providing a simple and effective route to stretchable conjugated polymer films[2]. In addition, chemical conversion of ester functionalities into carboxylic acids introduces efficient ion-transport capability, enabling the same polymer backbone to operate as an organic mixed ionic–electronic conductor.

Overall, this work highlights chemically transformable side chains as an effective and versatile design strategy for overcoming long-standing trade-offs in conjugated polymers. By separating the requirements of processing and device operation, this approach opens new opportunities for multifunctional organic electronic materials.

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[2] S. Y. Son *et al.*, *Nat. Commun.*, **13**, 2739 (2022)

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IL-19

Flexible Devices for Smart Sustainable Systems

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Flexible electronics has become an enormously explored technology for next-generation low-cost electronic systems due to its applicability in a broad range of applications towards smart textiles and wearable electronics. Moreover, flexible devices are being explored for eco-friendly and green electronics in recent times, to eventually reduce the impact of increasing electronic waste (E-waste) on environment, which has become a severe issue for earth, ecology, and health. Incorporation of biodegradable and edible materials in devices can be an excellent way to address these issues along with incorporating sustainability. In various devices for flexible electronics, organic transistors have been the most explored candidate due to their potential use for multifunctional, circuit, and sensing applications. In fact, development of various types of flexible sensing and energy harvesting devices has become very important for energy autonomous wearable electronics.
Here, firstly, approaches for designing high performance, multifunctional, and biodegradable organic transistors will be presented.[1,2] In addition, some strategies for development of low-cost wearable and smart systems will also be discussed. Devices for human-machine interaction and energy harvesting demonstrated through sustainable ways will be discussed.[3,4] These investigations highlight the promise towards implementation of low cost, flexible, and smart sustainable systems.

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[4] S. Maity, *et al.*, *Small*, **22**, e12603 (2026).

Shree Prakash Tiwari is currently working as a Professor in Electronics Engineering Department. He had done Ph.D. from IIT Bombay in 2008, followed by Postdoctoral work at Georgia Tech. Atlanta, USA, from 2008-2011.He leads Flexible Large Area Microelectronics (FLAME) Research Group, with focus towards sustainable electronics. Prof. Tiwari is a Senior Member of IEEE since 2016 and serves as selected member of technical committees on “Flexible Electronics and Displays” and “Electronic Materials” of IEEE Electron Devices Society. He is an active contributor of his area and was part of Indian Delegate to attend Indo-German Frontiers of Engineering Symposium in Bremen, Germany (2022) organized by Alexander von Humboldt Foundation and DST, India. He was conferred with “Institute Award for Research Excellence-2024, from IIT Jodhpur. He has co-authored over 200 research articles, including about 100 in journals of high repute primarily in IEEE, ACS, and Wiley.

IL-20

Functional metal-organic framework nanosheets assembled at the air/liquid interface

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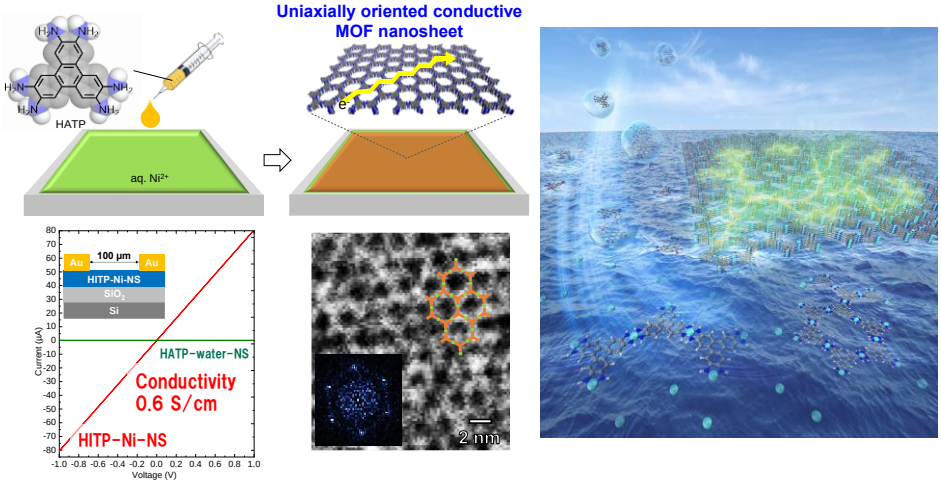
Development of rational methods for creating ordered two-dimensional (2D) structures with nanometer scale precision is one of the central issues in the nanoscience and nanotechnology fields because of their intrinsic physical-chemical properties which are seen in those of their equivalent bulk state. Inclusion of highly regulated nanopores into the nanosheet structure will further open the possible applications such as nanosieves, molecular/ion storage and sensor devices as well as introducing guest molecules into the nanopores tune variedly the sheet properties.
Here, I introduce a facile bottom-up synthesis of metal-organic framework (MOF) and hydrogen-bonded organic framework (HOF) nanosheets with both positional and size regulated nanopores utilizing air/liquid interfaces [1-7]. By applying liquid interfaces, growth direction of the object can be well controlled with utilizing self-assembly feature of the molecules under mild conditions. We have succeeded to tune finely the nanosheet structures by rational modification of molecular building units. The highly crystalline structure remains after transferring a solid substrate from the liquid surface as well as without any supports. Notably, such highly oriented porous crystalline structure is obtained specifically by applying bottom up synthesis at air/liquid interfaces, not by other techniques.



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Rie Makiura graduated from the University of Tsukuba. Following an extended spell as a researcher at the Frontier Device Research Center of SEIKO EPSON Cooperation in Nagano, where she worked on the development of organic electronic (OLED, TFT) devices and thin film all-solid batteries, she returned to academia as an Assistant Professor at the Department of Chemistry, Kyushu University. She was awarded her Ph.D. degree from Kyushu University in 2010. Subsequently, she was appointed as a tenure-track Lecturer, then promoted to an Associate Professor at the Department of Materials Science in Osaka Metropolitan University and a full Professor at the Department of Applied Chemistry in Tohoku University. She also serves as an editor of Applied Surface Science, Elsevier. Her research focus is currently on the rational design and construction of functional surface interface nanostructures of both inorganic and molecular materials including metal-organic frameworks.

IL-21

Single-ion Conducting Borate Network Polymer Electrolytes for Lithium Metal Battery Applications

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Although it is possible to readily estimate the theoretical energy densities of battery chemistries, the molecular processes that hinder practical performance are still unknown. Especially, the charging and discharging rates have become a major limiting factor in energy storage applications. Several solid electrolytes with exceptional ionic conductivity have been discovered, but all-solid-state batteries with high energy density have been only realized at limited rates (close to equilibrium), indicating that the minimization of overpotential requires to be considered to improve the rate performance other than the ionic transport. As single-ion polymer electrolytes, in which only selective cations are mobile across polymer electrolytes, facilitate minimizing not only the concentration gradient but also the overpotentials in the cells, such electrolytes pose great potential for overcoming these problems. However, single-ion polymer electrolytes have suffered from low ionic conductivity ($<10^{-5}$ S cm^{-1} at ambient temperature) which is at least two orders of magnitude smaller than that of liquid electrolytes. In this talk, I will present our ongoing efforts to develop a new class of single-ion conducting polymer electrolytes using an interpenetrated network polymer with weakly coordinating anion nodes, with a wide electrochemical stability window, a high room temperature conductivity of up to 1.5×10^{-4} S cm^{-1}, and exceptional selectivity for Li-ion conduction ($t_{Li+} = 0.95$). Significantly, lithium metal battery prototypes containing these electrolytes are shown to outperform a conventional battery featuring a polymer electrolyte. [1-4]

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[4] J. Gao, D.-M. Shin, *Adv. Sci.*, **11**, 2308530 (2024).

Dong-Myeong Shin is an Assistant Professor of Mechanical Engineering at the University of Hong Kong (HKU). His research focused on developing self-powered nanoelectronics, with an emphasis on the importance of power supply components such as energy harvesting and storage devices. His team has converted a variety of renewable energy resources, which include human motion, droplets, moisture, and wind, into electrical energy. Furthermore, in order to store such electrical energy from renewable resources, his team has designed and developed a new class of single-ion conducting polymer electrolytes for high-capacity battery applications.

IL-22

Energy Cascade Formation at Electron Transport Layer/Electrode Interfaces

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In organic semiconductor devices, electron transport layers (ETLs) inserted at the cathode–semiconductor interface significantly improve electron injection and collection. However, the underlying mechanism remains unclear because direct observation of lowest unoccupied molecular orbital (LUMO) alignment at organic/metal interfaces has been difficult. In this study, we used low-energy inverse photoelectron spectroscopy (LEIPS) [1] to directly probe the unoccupied electronic states of representative ETLs, including BCP, PDINO, and PFN-Br.
The LUMO levels observed for the pristine ETLs are much higher than the work functions of commonly used electrodes, 4–5 eV, and the LUMO levels of typical acceptor materials, approximately 3.5–4.0 eV. These results suggest large electron injection/collection barriers exceeding 2 eV, which is inconsistent with the efficient device operation enabled by ETLs. To resolve this discrepancy, we investigated the interfacial energy-level alignment at ETL/electrode interfaces. We found that metal atoms react with ETL molecules, lowering the LUMO level toward the Fermi level [2]. Furthermore, measurements of acceptor/ETL/electrode interfaces revealed the formation of an energy cascade from the semiconductor to the electrode, providing an efficient pathway for electron injection and collection [3].

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Hiroyuki Yoshida is a Professor at Chiba University, Japan (2015–present). He received his Ph.D. from the University of Tokyo in 1995 and subsequently worked at the Laboratoire Aimé Cotton, CNRS, France. He served as a research associate and assistant professor at the Institute for Chemical Research, Kyoto University, and was a PRESTO researcher at JST. His research focuses on occupied and unoccupied electronic states of organic semiconductors and halide perovskites. He developed low-energy inverse photoelectron spectroscopy (LEIPS), now widely used for probing unoccupied states, and has received multiple awards for this contribution.

IL-23

M13 Bacteriophage as a Programmable Biomaterial for Humanoid Olfactory Display

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Realizing a humanoid olfactory display—an artificial system that senses and classifies odor with mammalian acuity—demands a sensing material whose molecular recognition can be diversified as broadly as natural olfactory receptors, which conventional materials cannot achieve. We present the genetically engineered M13 bacteriophage as a programmable organic biomaterial that overcomes this bottleneck. Its major coat protein (pVIII) is engineered to display custom tripeptides; varying three terminal residues yields a combinatorial library exceeding 8,000 distinct artificial receptors. The phages self-assemble into ordered films with tunable structural color, and analyte-induced nanoscale swelling shifts their optical response, producing analyte-specific RGB patterns read out optically and classified by machine learning. [1, 2] This label-free platform detects and classifies volatile organic compounds, humidity, and explosives, and achieves over 90% accuracy in agricultural-origin and fruit-freshness applications.[3, 4] Extended to exhaled breath, the colorimetric electronic nose distinguishes lung-cancer patients from healthy controls with approximately 75% accuracy[5], supporting a field-deployable screening prototype. Finally, the same phage serves as a building block that assembles gold nanoparticles into three-dimensional SERS superstructures, extending the platform toward liquid-phase molecular diagnostics and establishing M13 phage as a unifying biomaterial for humanoid chemical perception.

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Jin-Woo Oh received a Ph.D. in Chemistry from Hanyang University in 2009 and worked as a postdoctoral researcher at UC Berkeley from 2010 to 2012. Since 2012, he has been a professor at Pusan National University, and since 2024, he has served as the Director of the Humanoid olfactory display Innovation research Center (HIrC).
His research focuses on humanoid olfactory display technology based on functional bionanomaterials, with a primary emphasis on developing M13 bacteriophages into high-performance bio-receptors through genetic engineering techniques. By integrating these bio-receptors—capable of selective and highly sensitive detection of various volatile organic compounds (VOCs)—with electronic nose systems, he is building a next-generation composite gas sensing system applicable to diverse fields, including environmental monitoring, disease diagnosis via label-free breath analysis, and food safety assessment. Furthermore, he aims to expand this work toward humanoid display technologies that enable the digitization of olfactory information, ultimately contributing to innovations in next-generation biosensors and human-robot interfaces.

Abstracts

General Lectures

GL-01

A Simply Synthesized and Highly Soluble Donor Polymer for Efficient Organic Photovoltaics

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Recently, donor polymers for organic photovoltaics (OPVs) have been required to exhibit not only high power conversion efficiency (PCE), but also synthetic accessibility and high solubility in nonhalogenated solvents such as toluene and o-xylene. In this study, we designed and synthesized a new donor polymer, PBDTTz-2BO, based on benzodithiophene and thiazole units. PBDTTz-2BO was synthesized in only nine steps from commercially available reagents. To improve solubility, alkylated thiophenes were introduced into the polymer backbone as side chains. Thiazole units were also incorporated to promote molecular ordering through intramolecular N···S noncovalent interactions. As a result, PBDTTz-2BO showed high solubility in both halogenated and nonhalogenated solvents, including toluene and o-xylene, while maintaining high crystallinity. OPV devices based on PBDTTz-2BO and L8-BO, a benchmark acceptor, achieved a high PCE of 17.9% when processed from chloroform. More importantly, devices processed from toluene and o-xylene also exhibited high PCEs of 17.5% and 17.6%, respectively, which were comparable to that of the chloroform-processed device. These results indicate that PBDTTz-2BO is a valuable donor polymer for the practical application of OPVs, owing to its high solubility in nonhalogenated solvents, simple synthesis, and high performance.

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GL-02

Rethinking Exciton Dissociation in Organic Photodetectors: An Electrostatic Potential Perspective Driven by Molecular Multipole Moments

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Bulk heterojunction (BHJ) organic photodetectors (OPDs) conventionally depend on donor/acceptor (D/A) interfacial energy offsets for exciton dissociation, but this dependence complicates morphology control and limits device reproducibility and stability. We report solution-processed single-component OPDs based on non-fullerene acceptors (such as Y6, IT-4F) with strong intrinsic D/A character, in which high molecular quadrupole moments drive ultrafast (<1 ps) formation of intermolecular charge-transfer excitonic (CTE) states.[1] Efficient photocurrent generation is achieved via strong quenching of these CTE states under reverse bias, without requiring D/A interfaces, exhibiting low dark current density ($\sim 10^{-9}$ A cm^{-2}) and high responsivity (≥ 0.15 A W^{-1}). This quadrupole-driven, interface-independent charge generation mechanism is further supported by a related study on partially chlorinated subphthalocyanine (Cl_6-SubPc), where an unusually large octupole moment produces a local electrostatic potential shift of ~200 meV, enabling ultrafast (<200 fs) free charge generation directly within the film.[2] Together, these results indicate that molecular electrostatic multipole moments, rather than interfacial energetics alone, can lead efficient exciton dissociation in OPDs. This perspective establishes quadrupole moment engineering as a key design principle for simplified, single-component OPDs, opening a pathway toward high-performance, morphology-independent organic photodetector architectures.

[1] S. Y. Park, *et al.*, *Advanced Materials*, **35** (49), 2306655 (2023).
[2] A. Rana and S. Y. Park, *et al.*, *Nature Communications*, **15**, 5058 (2024).

GL-03

Tuning the Properties of Thienoquinoid Compounds through Modification of Bridged Structures

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Thienoquinoid compounds, in which thiophenes or thienoacenes adopt a quinoidal structure, are a promising class of organic semiconductors owing to their high electron-accepting ability, narrow band gaps, and tunable open-singlet character. Among the various approaches, incorporation of a fused-ring structure into the thienoquinoid scaffold is a powerful strategy to modify their molecular structures and physical properties. In particular, heteroatom-bridged derivatives have attracted considerable attention, and their molecular structures, electronic properties, and semiconducting characteristics have been extensively investigated. To address this point, we focused on non-heteroatom bridging motifs, including aromatic rings, as an alternative strategy for modulating the properties of thienoquinoid compounds. We found, for example, that employing a thiophene ring to fix the quinoid backbone imparts an increased open shell character as well as reduced singlet–triplet energy gap compared to the corresponding non-fused analogue.[1] In this presentation, we will discuss the effects of the bridging units on the physical properties and semiconducting characteristics of thienoquinoid compounds.

[1] Y. Zhang, N. Ando, Y. Ie, *Synth. Met.* **319**, 118171 (2026).

GL-04

Enhanced Sensitivity in Low-Energy Inverse Photoemission Spectroscopy with an Off-Axis Parabolic Mirror for Efficient Light Collection.

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Inverse photoemission spectroscopy (IPES) is a powerful tool for investigating unoccupied electronic states where the electron beam is incident upon the sample and the emitted photons are detected. However, its broader application is hindered by inherently low sensitivity, caused by the low probability of photon emission during the transition of free electrons to the unoccupied states. To enhance sensitivity through improved photon collection, an off-axis parabolic (OAP) mirror is designed and fabricated for the low-energy version of the IPES (LEIPS). Optical simulations showed that the OAP mirror increased photon collection efficiency from 3.06% to 63.3%, which is experimentally validated in the lowest unoccupied molecular orbital (LUMO) spectra of C60 thin films. The OAP mirror-LEIPS system is applied to study the energy level alignment (ELA) of pentacene films on substrates with different work functions (WF). By measuring both the highest occupied molecular orbital (HOMO) and LUMO levels, the evolution of transport gaps and the ELA of HOMO and LUMO with the Fermi level are analyzed. Pentacene exhibited n-type behavior on a low WF substrate (Cs_2CO_3) and switched to p-type on a high WF substrate (ITO). The OAP mirror-enhanced LEIPS system significantly reduced the time required for such experiments, enabling efficient and reliable measurements.

Keywords: Inverse photoemission, unoccupied state density of states, organic semiconductors, interface energy level alignments.

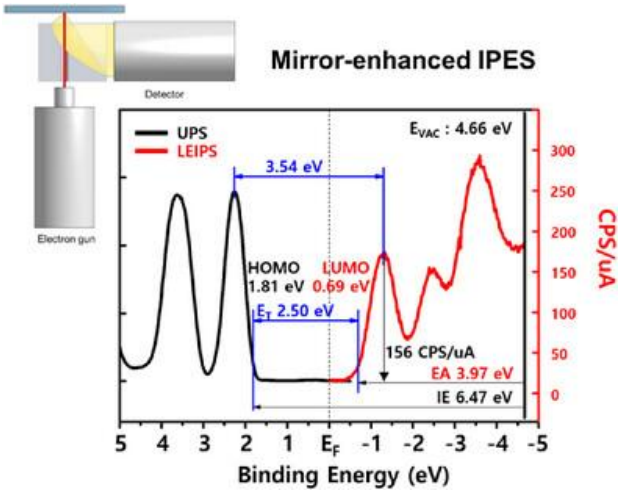

Figure 1. Upper left: Experimental geometry for mirror-enhanced LEIPS. Lower right: Occupied and unoccupied state DOS of 10 nm C60 thin film on Ag substrate measured by UPS and LEIPS

GL-05

Reconfigurable Ternary Logic Circuits with Antiambipolar Transistors

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Multivalued logic circuits hold promises as alternatives to the current binary logic circuits because of their abilities for high-integration density, low-power consumption, and high-speed operation [1,2]. Here, we achieved reconfigurable ternary inverter operations by combining with an organic antiambipolar transistor and a gold floating gate incorporated into a hafnium oxide (HfO_2) gate insulator. First, a standard ternary inverter operation was demonstrated at a low input voltage of 2 V, owing to the high dielectric constant of the HfO_2 gate insulator. Furthermore, the voltage transfer curve was laterally shifted up to 1.8 V by controlling the trapped carriers, namely holes or electrons, into the floating gate [3]. This function consequently realized reconfigurable ternary inverter operations. Three representative ternary inverters, which are standard, negative, and positive ternary inverters, were exhibited with the same input voltages by adjusting the charge condition of the floating gate. Our finding thus has the potential to attain a new computing architecture surpassing the capabilities of the current von Neumann systems.

Acknowledgement
This research was supported by JSPS Kakenhi grant number 23H00269, the National Security Technology Research Promotion Fund of the Acquisition, Technology & Logistics Agency, Ministry of Defense, grant number JPJ004596.

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[2] K. Kobashi *et al.*, *Nano Lett.* **18**, 4355 (2018).
[3] R. Hayakawa *et al.*, *J. Mater. Chem.* C **13**, 14234 (2025).

GL-06

Electrolyte-Induced Transition from Depletion-Mode to Quasi Accumulation-Mode Operation in PEDOT:PSS Organic Electrochemical Transistors

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Organic electrochemical transistors (OECTs) based on PEDOT:PSS typically operate in depletion mode, where electrolyte ions penetrate the channel and induce electrochemical de-doping of the initially doped PEDOT:PSS, thereby modulating its conductivity [1]. Herein, we demonstrate an electrolyte-driven transition from depletion-mode to quasi-accumulation-mode operation using imidazolium-based ionic liquids (i.e., EMIM-OTF, EMIM-BF_4, and EMIM-TFSI) in place of a conventional aqueous NaCl electrolyte. Electrical characterization reveals that the transistor operating mode is strongly governed by ion transport, ion-polymer interactions, and charge-compensation mechanisms within the PEDOT:PSS channel. The highly concentrated ionic environment and enhanced ion-polymer coupling provided by ionic liquids alter channel charging dynamics, promoting charge accumulation alongside conventional doping and de-doping mechanisms. The roles of device architecture and channel crystallinity in the transition from depletion-mode to quasi-accumulation-mode operation were systematically investigated using planar and vertical OECTs fabricated with pristine and sulfuric acid-treated PEDOT:PSS. Sulfuric acid treatment removes excess PSS and increases the crystallinity of PEDOT:PSS, thereby clarifying the impact of channel crystallinity on the operational characteristics and mode transition of OECTs [2]. These findings establish electrolyte engineering as a powerful strategy for tuning OECT operation offering a pathway to advance adaptive iontronic and neuromorphic devices.

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[2] Kim, S. M., Kim, C. H., Kim, Y., Kim, N., Lee, W. J., Lee, E. H., ... & Yoon, M. H, et al., *Nature communications*, *9*(1), 3858 (2018).

GL-07

Design of Electric Field - Polarization Responses in Molecular Ferroelectrics

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Ferroelectrics exhibit hysteresis in their electric field-polarization (*P*-*E*) curves, and their performance is characterized by the residual polarization value (P_r) at E = 0 V and the coercive electric field (E_c) required for polarization inversion. We have been developing organic ferroelectrics that focus on the dynamics of ions and polar units in molecular assemblies where molecular dynamics, such as those in liquid crystals and plastic crystals, are permitted.[1, 2] Furthermore, from the perspective of controlling the E_c value, we have developed liquid crystal ferroelectrics that control molecular dynamics by introducing chiral units.[3] Furthermore, by focusing on plastic crystals, we have created a system in which molecular orientation freedom and conformational change freedom coexist, and have also succeeded in realizing a dual *P*-*E* hysteresis curve.[4] In the presentation, we will introduce recent results regarding molecular design strategy that enable the control of P-E hysteresis in ferroelectrics, based on a series of studies.

[1] T. Takeda, T. Akutagawa., *Chem. Commun*., **2022**, *58*, 11898. [2] K. Sambe, T. Akutagawa., *et al*, *J. Am. Chem. Soc*. **2024**, *146*, 8557. [3] J. Wu, T. Akutagawa., *et al*., *J. Phys. Chem. C*. **2022**, *146*, 8557. [4] N. Onodera, T. Akutagawa., *et al*., *J. Am. Chem. Soc*., **2025**, *147*, 19200.

GL-08

Fullerene Acceptors for Efficient Charge Separation

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Organic semiconductors typically exhibit large exciton binding energies, which fundamentally limit efficient charge separation. To overcome this challenge, considerable efforts have been devoted to molecular design strategies aimed at increasing the dielectric constant and extending the hole–electron separation distance.
Recent studies on non-fullerene acceptors have demonstrated that highly ordered molecular packing promotes strong intermolecular electronic coupling, giving rise to efficient charge separation. In contrast, fullerene acceptors (FAs), such as PCBM, exhibit inefficient charge separation, with photoexcited states predominantly decaying to triplet excitons via intersystem crossing, despite their intrinsic advantages, including isotropic three-dimensional charge-transport networks and relatively high dielectric constants.
Here, we report a FA molecularly engineered to promote intermolecular π–π interactions and extend the π-electron network, thereby enabling efficient charge separation and enhanced photocatalytic hydrogen evolution. Covalent integration of a bithiophene moiety bearing a dicyanoindanone terminal group into the fullerene framework simultaneously provides a rigid molecular architecture and strong visible-light absorption through intramolecular donor–acceptor interactions. As a result, the FA exhibits forms multiple short intermolecular π–π interaction, giving rise to a long lived charge separated states and a markedly enhanced hydrogen evolution rate compared with PCBM.

Abstracts

Young Scholar Lectures

YS-01

Microfluidic fabrication of hydrogel optical fibers with two functions by tuning swelling for simultaneous ionic conductivity and light transmission

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Bioelectronics and soft robotics require multifunctional hydrogel fibers with integrated optical and electrical features. Here, we describe conductive hydrogel optical fibers (CHOFs) that use microfluidic coaxial extrusion to combine mechanical flexibility, ionic conductivity, and light transmission. The fibers have core-cladding structures constructed of acrylamide and alginate double-network hydrogels. For optical waveguiding under ionic circumstances, regulated differential swelling and preserved refractive index contrast were made possible by the deliberate addition of sodium acrylate (SA) to the cladding. With a numerical aperture of 0.339, an optical attenuation of 0.088 dB cm^{-1}, an ionic conductivity of 26.6 mS cm^{-1} in 1.0 M NaCl, and a stretchability of up to 321% strain, systematic SA modulation (0–5 mol%) showed exact property control. With a gauge factor of 1.21, these CHOFs can serve as strain sensors without sacrificing optical transmission.[1] The dual functionality in wearable devices was tested by real-time human motion detection, which showed better performance under mechanical deformation than traditional optical fibers. Applications requiring integrated optical transmission, electrical conduction, and mechanical sensing can use these CHOFs as a platform.

[1] Yoon, *et al.*, *J. Mater. Chem. C*, **14**, 3171–3180 (2026).

YS-02

Interfacial Engineering for Chloride-Rich Deep-Blue Perovskite LEDs via Self-Assembled Monolayers

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Lead halide perovskite light-emitting diodes (PeLEDs) are promising for next-generation displays because of their tunable bandgap, narrow emission linewidth, and high color purity. However, efficient deep-blue emission below 460 nm remains challenging, especially in chloride-rich $CsPb(Br_{1-x}Cl_x)_3$ compositions, where Br^-/Cl^- ionic mismatch can induce compositional instability and nonradiative losses. Interfacial energetic mismatch and defect-mediated recombination at the hole-transport-layer/perovskite interface further limit device performance. Here, we employ a NiO_x/self-assembled monolayer (SAM) bilayer hole-transport layer as an interfacial engineering strategy for chloride-rich deep-blue PeLEDs. The SAM interlayer is introduced to improve wettability, passivate interfacial defects, and tune energy-level alignment on the NiO_x surface. By systematically varying the Cl composition and SAM modification, we investigate their influence on film morphology, photoluminescence characteristics, electroluminescence wavelength, leakage current, and operational stability. This study provides practical guidance for designing robust HTL/perovskite interfaces toward efficient and stable deep-blue PeLEDs.

YS-03

One Molecule, Two Pathways: Distinct Crystallization Mechanisms Enabled by Fluorinated Phenethylammonium in Tin Perovskite Solar Cells

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Controlling crystallization is essential for improving the performance of tin perovskite solar cells. Here, we demonstrate how the same fluorinated organic cation, fluorinated phenethylammonium (FPEA), regulates crystallization through two distinct pathways: pre-passivation using FPEABr[1] and A-site incorporation of FPEA[2] (**Fig. 1**). Compared with the reference PEA-based system, which exhibits kinetically limited nucleation during spin coating, both approaches modify crystallization. Pre-passivation combined with hot anti-solvent treatment accelerates DMSO removal and promotes the formation and reconstruction of an ordered intermediate phase.[1] In contrast, A-site incorporation combined with a pre-annealing static stage (PASS) induces a metastable intermediate phase and gradual FPEA incorporation into it.[2] During thermal annealing, the reference film undergoes sluggish perovskite conversion and suppressed Ostwald ripening due to partially nonuniform crystal growth and kinetically disordered nucleation. Both FPEA pathways prolong Ostwald ripening and promote efficient crystal growth. Consequently, the resulting films exhibit enlarged grain size, enhanced crystallinity, and reduced energetic disorder. Device efficiency increases from 7.99% to 9.13%[1] and 9.29%[2] for the pre-passivation and A-site incorporation pathways, respectively. These findings show that one molecular species can regulate crystallization through distinct pathways, providing a general strategy for tin perovskite solar cells.

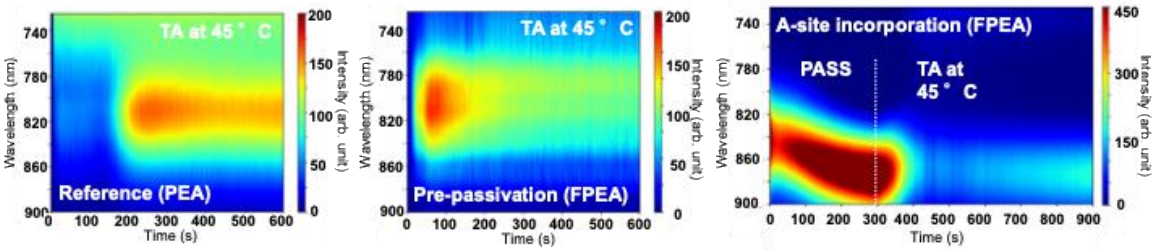

Figure 1. Distinct Crystallization Pathways Enabled by Fluorinated Phenethylammonium (FPEA).

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Abstracts

Special Presentation from Industry

SP-01

Controllable Vacuum Chamber Systems for Perovskite Research

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Korea Kiyon Co., Ltd. presents a modular vacuum platform for perovskite and perovskite-tandem photovoltaic research, built on 42 years of glovebox/vacuum engineering experience, allowing researchers to start with a glovebox and add deposition chambers as needed. The system covers the full device stack (HTL, perovskite, ETL, TCO, metal, ALD encapsulation) via evaporation, sputtering, and ALD, with in-wafer thickness uniformity under 10%. A key feature is fully integrated in-situ photoluminescence monitoring for real-time compositional and band-gap tracking during growth. For tandem devices, a CIGS/perovskite double-cluster system combined with spatial ALD and close-space sublimation (CSS) enables high-throughput, large-area processing, achieving good thickness uniformity across a wide range of conditions. We share representative results demonstrating reproducible, research-grade perovskite and tandem solar cell fabrication.

Abstracts

Poster Presentations

August 26th, 2026 (Wed) Vernazza Hall (3F), Hanwha Resorts

PS1-002

Thickness-Dependent Optimization of TiO_2 Composite Dielectrics for Water Droplet Electricity Generators

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Water droplet electricity generators (DEGs) are energy harvesting devices that utilize electrostatic interactions at liquid–solid interfaces [1] . Incorporation of inorganic fillers such as TiO_2 into dielectric layers has been reported to enhance device performance through increased dielectric permittivity and promoted interfacial charging [2]. However, how these effects depend on dielectric film thickness has not been sufficiently clarified, particularly from the viewpoint of charges and energy that directly contribute to device operation.

In this study, the thickness-dependent performance of DEG devices employing TiO_2 composite dielectrics was systematically investigated using the effective mobile charge and generated electrical energy as the primary evaluation metrics. Devices with different dielectric thicknesses and TiO_2 loadings were fabricated, and transient currents generated during droplet impact were measured under identical experimental conditions. The mobile charge and generated electrical energy were quantified by time integration of the transient current.

The results show that TiO_2 incorporation increases both the mobile charge and generated electrical energy in thin dielectric films, whereas these advantages diminish with increasing thickness. This behavior is attributed to reduced charge extraction efficiency caused by dielectric shielding and weakened electrostatic coupling. These findings provide physical insight into thickness-dependent performance and support rational design of DEG devices.

[1] W. Xu *et al.*, *Nature*, 578, 392 (2020) .
[2] Y. Aoki, D. Tajima, *Mol. Cryst. Liq. Cryst.*, 769, 1315 (2025).

PS1-009

Hydrolytic behaviors of l-PLA/PBS and l-PLA/PBEAS mixture monolayers and their mechanical properties

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The nylon 6-based fishing nets are widely used. However, huge waste nets in ocean and river do not be degraded for a longer time and cause significant marine pollution in the marine ecosystem [1]. Biodegradable poly (butylene succinate) (PBS) and poly (butylenesuccinate-co-butyleneadipate-co-ehtylenesuccinate-co-ethyleneadipate) (PBEAS) are eco-friendly bioplastics for fisheries because they can modulate the ghost fishing problems [2]. Unlike conventional PBS, PBEAS has improved flexibility and low cost, but it is fast hydrolyzed. To overcome this issue, we investigated the compatibility and hydrolytic behavior of the l-PLA/PBS and l-PLA/PBEAS mixtures by the Langmuir system at the

air/water interface. From π-A curves of well mixed and unmixed model systems. the l-PLA/PBEAS (1/1 by wt) monolayer mixture showed better compatibility than the l-PLA/PBS one. The degradation rate of PBS and PBEAS, which have a fast rate of hydrolysis, could be adjusted by adding l-PLA. Furthermore, we studied the mechanical and thermal properties of the mixtures.

[1] R. Skvorčinskienė, *et al*., *Waste Biomass Valor*, **10,** 3735 (2019).
[2] K. Seonghun, *et al*., *Aquatic Conserv: Mar Freshw Ecosyst*, **30**, 1868 (2020).

PS1-011

Two-Dimensional Perovskite Nanosheet-Based Nanocrossbar Ferroelectric Tunnel Junction Memory

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Ferroelectric tunnel junctions (FTJs) are promising candidates for non-volatile memory; however, conventional bulk-oxide FTJs face severe scaling limitations caused by depolarization fields and defect-induced leakage currents [1]. Building on our recent demonstration of inverse area scaling in nanoconfined HfO_2-based FTJs [2], we developed atomically defined nanocrossbar FTJs using single-crystalline two-dimensional (2D) Dion-Jacobson perovskite nanosheets [3,4] to overcome these limitations. Direct electrical measurements reveal a strong dependence of ferroelectricity on the crystallographic layer parity: odd-layered homologs (m = 3, 5) act as switchable tunnel barriers, while even-layered counterparts (m = 4, 6) remain paraelectric. By combining a single-droplet nanosheet assembly process with aggressive lateral scaling, the active junction area was reduced to 520 nm^2. The tunneling electroresistance (TER) ratio increased as the junction area decreased, reaching approximately 35 in the smallest devices. Cryogenic measurements, along with Simmons′ direct-tunneling analysis, demonstrate that nanoconfinement statistically suppresses extrinsic leakage pathways, thereby revealing intrinsic polarization-controlled tunneling transport. These highly confined 2D FTJs show robust switching endurance (>100 cycles) and an extrapolated non-volatile retention of over 10 years. The results establish that statistical defect avoidance and crystallographic layer parity are key design principles for scalable 2D ferroelectric tunnel memories and future post-Moore neuromorphic architectures.

[1] V. Garcia and M. Bibes, *Nat. Commun.*, **5**, 4289 (2014).
[2] Z. Sun, Y. Nakamura, K. Okamoto, S. Izawa, H. Funakubo, and Y. Majima, *Nanoscale*, **18**, 2525 (2026).
[3] B.-W. Li, M. Osada, Y.-H. Kim, Y. Ebina, K. Akatsuka, and T. Sasaki, *J. Am. Chem. Soc.*, **139**, 10868 (2017).
[4] Y. Li, M. Shimada, M. Kobayashi, E. Yamamoto, R. Canton-Vitoria, X. Liu, and M. Osada, *Dalton Trans.*, **53**, 18122 (2024).

PS1-014

Molecular Design and Low-Temperature Mechanical Property Prediction of a PA/TPU/Amino-PDMS Ternary Hybrid Hot-Melt Adhesive for Cryogenic Applications

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Cryogenic environments impose severe thermal shrinkage stress on polymer binders, often leading to brittle fracture and deterioration of adhesive performance. In this study, a ternary hybrid hot-melt adhesive composed of acid-terminated aliphatic polyamide (PA), amino-functionalized polydimethylsiloxane (amino-PDMS), and thermoplastic polyurethane (TPU) was designed to improve low-temperature adhesion reliability. Acid-terminated PA was synthesized via melt polycondensation using an excess amount of dicarboxylic acid to precisely control terminal carboxyl groups. Amino-PDMS was incorporated to enhance low-temperature flexibility, while TPU served as a compatibilizer to improve cohesion and interfacial compatibility within the hybrid system.
Among the investigated formulations, the optimized composition (H-Target 1) exhibited a melt viscosity of 6,200 mPa·s at 190°C and a softening point of 128°C, satisfying industrial processing requirements. The enhanced performance of H-Target 1 was attributed to ionic interactions between the carboxyl groups of PA and the amino groups of amino-PDMS, together with hydrogen-bonding interactions within TPU hard segments. Furthermore, dispersed silicone domains effectively hindered crack propagation under cryogenic conditions, resulting in improved resistance to brittle fracture and enhanced low-temperature adhesive reliability. These results demonstrate the potential of the proposed ternary hybrid system as a high-performance hot-melt adhesive for cryogenic applications.
[1] E. Yilgör, et al., *Prog. Polym. Sci.* **39**, 1165–1195 (*2014*)
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[3] H. Hiu, et al., *Polymers*, **15**, 2284. (*2023*)

PS1-015

Photoinduced High-Resolution Ultranarrow Red Emission for Pure Organic T2T Microcrystals

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Narrow-band light sources with high spectral purity are essential for next-generation photonic and optoelectronic applications such as augmented-reality, holography, flexible optoelectronics, or head-up-display systems. Here, we report ultranarrow red photoluminescence (PL) from pure organic self-assembled microcrystals (SAMCs) made of π-conjugated 2,4,6-tris(biphenyl-3-yl)-1,3,5-triazine (T2T).
[1] The T2T SAMCs were fabricated via reprecipitation followed by thermal annealing, and Grazing-incidence wide-angle X-ray scattering(GIWAXS) confirmed their triclinic crystal structure. The T2T SAMCs exhibited an ultranarrow PL peak at 625 nm with a full width at half maximum of 3.2 nm. Continuous laser irradiation induced photo-brightening effect and gradually enhanced PL intensity. Power-dependent PL measurements, supported by density functional theory simulations, indicate that the ultranarrow emission originates from self-trapped excitons rather than amplified spontaneous emission. Raman and time-resolved PL analyses further suggest that laser-induced molecular rearrangement leads to the photo-brightening effect and the emergence of the sharp emission. The emission remained constant for peak position and linewidth under different excitation conditions, demonstrating excellent spectral stability. Spatially localized excitation enabled controllable red emission from individual T2T SAMCs, highlighting their potential as high-resolution light sources for advanced photonic and optoelectronic devices.

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PS1-017

Solution-Processed Nanoscale MXene Thin Films for High-Performance Shape-Adaptable Wearable Heaters

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Two-dimensional transition metal carbides, known as MXenes, have emerged as promising candidates for flexible electronics due to their excellent metallic conductivity and hydrophilicity. In this study, we report the fabrication of shape-adaptable and wearable heaters based on Ti3C2Tx MXene through efficient solution processing. Ti3C2Tx MXene was synthesized using the minimally intensive layer delamination (MILD) method [1] to produce high-quality, large-scale flakes. To achieve uniform nanoscale thin films, substrates were functionalized with APTES to improve surface adhesion before spin-coating the MXene solution. The resulting transparent thin films exhibited tunable sheet resistance and high optical transmittance depending on the MXene concentration. Our MXene thin film heaters (TFHs) demonstrated rapid thermal response and exceptional electrothermal stability over 50 heating/cooling cycles. Furthermore, we successfully fabricated flexible heaters on PET substrates and wearable thread heaters that can be integrated into fabrics using a commercial sewing machine. These sewable MXene heaters maintained performance under mechanical deformations such as bending and twisting. These findings suggest that solution-processed MXene thin films provide a versatile platform for the next generation of shape-adaptable and high-performance wearable electronic devices.

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PS1-018

Position-Engineering of Terphenyl-Based Hosts for the Optimization of Blue Phosphorescent OLEDs

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Organic light-emitting diodes (OLEDs) have achieved significant advancements and are now widely utilized across various display technologies. Implementing a host–dopant system stands as a highly effective device engineering strategy to boost overall performance [1, 2]. Designing an optimal host demands a high triplet energy (T_1) state, well-aligned highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) levels, along with robust thermal stability. Carbazole (Cz)-derived hosts, such as 4,4′-Bis(N-carbazolyl)-1,1′-biphenyl (CBP) and 1,3-Bis(N-carbazolyl)benzene (mCP), have attracted substantial interest owing to their pronounced electron-donating properties. Driven by these requirements, two novel carbazole-based host materials, 9-([1,1':3',1"-terphenyl]-5'-yl)-9H-3,9'-bicarbazole (mTP-CzCz) and 9-([1,1':4',1"-terphenyl]-2'-yl)-9H-3,9'-bicarbazole (pTP-CzCz), were synthesized. In these structures, the phenyl groups within the central

terphenyl (TP) core are linked in meta and para configurations, allowing for a comparative study of the structural effects associated with the phenyl linkage position. In the film state, mTP-CzCz and pTP-CzCz exhibited maximum photoluminescence (PL) peaks in the violet region at 389 and 394 nm, respectively. Their decomposition temperatures (T_d) were 413 °C and 373 °C. Consequently, the applicability of these two materials as blue hosts was evaluated through OLED device characterization.

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PS1-019

Highly Deformable Capacitive Sensor Based on Self-Assembled Block Copolymer Structural Colors

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Mechanochromic sensors that convert mechanical stimuli into visible color changes offer intuitive, electronics-free readout, yet most are limited by poor stretchability and a single sensing modality. Here we report a highly deformable capacitive sensor that couples self-assembled block copolymer (BCP) one-dimensional photonic crystals with a capacitive transducer, enabling simultaneous optical and electrical readout of deformation. A lamellar polystyrene-*block*-poly(2-vinylpyridine) (PS-*b*-P2VP) film was spin-coated and solvent-annealed to generate brilliant structural color, then quaternized and combined with an ionic gel (LiTFSI/P(VDF-TrFE-CFE)) by spin-coating to form a soft, deformable photonic film (BCP SC:IG). Embedding this film in PDMS between hydrogel electrodes and encapsulating it with a VHB film yielded a fully stretchable, dual-mode sensor. Under deformation, the lamellar period contracts and reversibly blue-shifts the reflected color, while the capacitance increases monotonically with strain, as confirmed by 2D SAXS. The device visualizes finger bending and local pressure in real time and recognizes the location and shape of a stimulus directly from the spatially resolved color pattern, without a pixelated electrode array. This integration provides a simple route to deformable, self-reporting sensors for wearable electronics and human–machine interfaces.

PS1-021

Low-Toxicity Ternary Solvent Engineering for Scalable Slot-Die Coated Perovskite Solar Cells

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Slot-die coating is a highly promising scalable deposition technology for advancing the commercialization of perovskite solar cells (PSCs), However, realizing high-performance devices demands precise solvent engineering, as the physicochemical properties of the coating ink are strongly coupled with coating parameters that critically govern film formation dynamics and device performance. Herein, we rationally designed a low-toxicity ternary solvent system comprising dimethyl sulfoxide

(DMSO), acetonitrile (ACN), and 1,3-dimethyl-2-imidazolidinone (DMI). Rheological and morphological analysis reveal that ACN effectively reduces ink viscosity and surface tension while accelerating initial nucleation through its high volatility, facilitating uniform wet-film formation during slot-die coating. Meanwhile, DMI regulates crystallization kinetics by suppressing secondary nucleation through its low vapor pressure and coordination interaction with organic cations, precisely controlling crystal growth. The combined effect of these three solvents yields perovskite films with superior morphological characteristics, including larger grain sizes, enhanced film thickness, and significantly reduced defect density. The optimized PSCs exhibit a remarkable power conversion efficiency of 20.62% (unit cell, 0.1 cm^2) and 18.90% (minimodule, 2.6 cm^2), along with excellent thermal, and long-term stability. This work provides a promising pathway for environmentally safer, ink-based slot-die-coated PSCs and provides mechanistic insights into rational solvent design strategies for scalable, high-performance perovskite solar cells.

PS1-022

Synergistic Bilayer Passivation for Efficient and Stable Vacuum-Processed Perovskite Solar Cells

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Vacuum deposition is a promising approach for fabricating perovskite solar cells (PSCs) due to its precise thickness control, high reproducibility, and compatibility with large-area manufacturing. However, nonradiative recombination and unfavorable interfacial energetics at the perovskite/electron transport layer (ETL) interface continue to limit the performance and stability of vacuum-processed devices. Here, we introduce a synergistic bilayer passivation strategy employing ethylenediammonium diiodide ($EDAI_2$) and 4-methoxyphenethylammonium iodide (4MeO-PEAI) to engineer the perovskite surface and interface. $EDAI_2$ effectively passivates halide vacancies and undercoordinated Pb^{2+} defects[1], suppressing nonradiative recombination, while the subsequent 4MeO-PEAI treatment further reduces residual surface defects, optimizes interfacial energy alignment through dipole formation, and improves moisture resistance.[2] The complementary functions of the two passivation layers lead to enhanced charge extraction and reduced interfacial losses. As a result, vacuum-deposited p-i-n PSCs achieve a power conversion efficiency of over 20.0%, significantly outperforming control devices. In addition, unencapsulated devices retain 94% of their initial efficiency after 1000 h of storage under inert conditions. These results demonstrate that synergistic bilayer surface passivation is an effective strategy for simultaneously enhancing the efficiency and stability of vacuum-processed PSCs.[3]

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PS1-023

Inkjet Printed Perovskite Solar Cells by Solvent Engineering Approach

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Inkjet-printed perovskite solar cells have achieved power conversion efficiencies exceeding 20%, making them a promising technology for large-scale roll-to-roll manufacturing.[1] However, their performance is often limited by film defects such as voids, pinholes, non-uniform crystallization, coffee-ring effect, etc.[2] Many of these defects originate from improper wetting and uncontrolled drying dynamics during printing.[3] Therefore, achieving a uniform wet film is essential, as it serves as the foundation for obtaining high-quality solid thin films. In this work, we design a multi-solvent precursor ink based on the physical and chemical properties of the constituent solvents, including donor number, boiling point, surface tension, and other relevant parameters. Through careful optimization of the solvent composition, we effectively mitigate film defects by controlling the surface tension, viscosity, and evaporation behavior of the printed droplets. This solvent engineering approach enables improved wet-film formation and promotes uniform crystallization, thereby facilitating the fabrication of high-quality perovskite films for efficient inkjet-printed solar cells.

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PS1-024

Development and Characterization of a Microcapsule-Based Latent Curing Agent for Low-Temperature Storage-Stable Epoxy Resin Systems Applied to BSP Films

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Backside protection (BSP) films are important materials in advanced semiconductor packaging because they protect wafers or panels and reduce process-induced warpage. Epoxy-based systems are promising for BSP film applications owing to their thermal stability and mechanical reliability; however, conventional imidazole curing accelerators often show poor storage stability due to their high reactivity at room temperature. In this study, a microcapsule-based latent curing agent was developed to balance curing activity and storage stability in epoxy resin systems. An imidazole-isocyanate adduct was synthesized as a core material and subsequently microencapsulated using epoxy, water, and isocyanate to impart latent curing characteristics. The prepared core and microcapsule-type curing agents were evaluated by FT-IR, thermal analysis, curing response, and viscosity change in epoxy resin. The microcapsule-type curing agent maintained curing capability while showing a slower viscosity increase than the non-encapsulated core material and conventional imidazole accelerator. These results suggest that microencapsulation is an effective approach for controlling imidazole reactivity and improving the storage stability of epoxy resin systems for BSP film applications.

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PS1-026

Dual-Gate Organic Antiambipolar Transistors for Reconfigurable Binary and Ternary Logic Circuits

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The rapid expansion of the Internet of Things (IoT) and data-intensive computing has intensified the demand for high-performance processing in flexible and wearable edge devices with a small footprint. While organic integrated circuits are promising candidates, their low integration density remains a major bottleneck due to incompatibility with high-resolution lithography. Reconfigurable logic (RL) and multi-valued logic (MVL) have emerged as new paradigms that achieve complex circuit-level functionality within a limited device footprint, circumventing the need for high-resolution lithography. Here, we demonstrate a binary/ternary reconfigurable logic device using a single dual-gate organic anti-ambipolar transistor (DG-OAAT). This dual-gate structure enables the integration of two different concepts (RL and MVL), enhancing functional density within a minimal footprint. The OAAT exhibits characteristic *Λ*-shaped transfer curves with negative differential transconductance via a *p–n* heterojunction, and field-effect doping modulated by top-gating enables real-time logic reconfiguration.[1,2] Notably, transient measurements demonstrate highly reversible and reliable switching between logic operations. This architecture significantly improves device versatility and offers an effective pathway for high-density organic integrated circuits.

Acknowledgement
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PS1-027

Fabrication of Ultrathin PhOLEDs via Molecular Co-Deposition: Enhanced Blue Color Purity and Green External Quantum Efficiency

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Organic light-emitting diodes (OLEDs) with high efficiency and color purity are important for high-resolution displays. Organic molecular beam deposition (OMBD) enables precise control of deposition rates in a high-vacuum, thereby improving organic thin-film quality.[1] Phosphorescent OLEDs (PhOLEDs) were fabricated using co-deposition of TCTA donor with FIrpic or $Ir(ppy)_3$ dopants in an ultrathin emitting layer, resulting in a total organic-layer thickness of 42 nm. For blue PhOLEDs, the optimized TCTA:FIrpic ratio of 5:1 yielded a maximum external quantum efficiency (EQE) of 11.7% at a luminance of 207 cd m^{-2}. The incorporation of T2T:TmPyPB acceptor co-deposition layer (A-CDL) reduced the full width at half maximum of electroluminescence (EL) spectrum from 70 to 55 nm and

shifted the CIE coordinates from (0.18, 0.39) to (0.16, 0.34), demonstrating enhanced blue color purity. For green PhOLEDs, the optimized TCTA:$Ir(ppy)_3$ ratio of 5:1 achieved a maximum EQE of 20.9% at a luminance of 177 cd m^{-2} and a maximum luminance of 14,740 cd m^{-2}. GIWAXS patterns showed that co-deposition of TmPyPB suppressed the rod-like packing of T2T,[2] producing more amorphous morphology consistent with improved electron transport and reduced driving voltage. Back-focal-plane photoluminescence and angle-resolved EL measurements suggested more isotropic dipole-emission distribution [3] with the co-deposition layers.

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PS1-028

Molecular Design of DTP-Based Non-Fullerene Acceptors for SWIR Organic Photodetectors

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Short-wavelength infrared (SWIR) organic photodetectors (OPDs) have recently attracted considerable attention. However, organic semiconducting materials capable of sensitive photodetection in the long-wavelength SWIR region remain limited. In this work, two narrow-bandgap non-fullerene acceptors, DOT-DO ($E_g^{opt} \approx 1.02$ eV) and DOT-DD ($E_g^{opt} \approx 1.05$ eV), were synthesized by incorporating a dithieno[3,2-b:2′,3′-d]pyrrole (DTP) unit as the central electron-donating core. Compared with the conventional cyclopentadithiophene-based acceptor COTIC-4F ($E_g^{opt} \approx 1.1$ eV), the replacement of the bridgehead sp^3-hybridized carbon atom with an sp^2-hybridized nitrogen atom enhances the electron-donating ability and backbone coplanarity of the acceptor backbone. Moreover, cyano substitution on the π-bridges further strengthens the electron-withdrawing character, thereby promoting stronger intramolecular charge transfer, red-shifted SWIR absorption, and favorable energy-level modulation for efficient photodetection. Consequently, both DOT-DO and DOT-DD based OPDs exhibit similarly low dark current densities of approximately 10^{-9} A cm^{-2} under a −0.5 V bias. Compared with DOT-DD, the DOT-DO based OPD achieves higher responsivity, reaching 0.22 A W^{-1} at 1100 nm. Notably, it maintains a responsivity exceeding 0.10 A W^{-1} even at 1200 nm, resulting in a high specific detectivity of 1.37×10^{12} Jones. These findings highlight DTP-centered donor-core engineering as an effective strategy for improving SWIR OPD performance.

PS1-029

Investigating the Role of Thiophene π-Bridge Units in Fused-Ring Donor Polymers for Inverted Polymer Solar Cells

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In recent years, sustainable energy technologies have attracted considerable attention to address environmental and energy challenges associated with fossil fuels[1,2]. Polymer solar cells (PSCs) based on non-fullerene acceptors (NFAs) offer advantages including flexibility, low cost, lightweight, and scalability, with power conversion efficiencies (PCEs) approaching 20% [3]. Donor polymers with donor-acceptor (D-A) architectures have accelerated PSC development through tunable energy levels, favorable morphology, and broad light absorption [4]. However, the influence of thiophene π-bridge units on structure-performance relationships remains insufficiently understood. In this study, we investigate two benzonitrile-based donor polymers designed with different π-bridge configurations. Benzonitrile was selected as the electron-withdrawing acceptor unit because of its high electron affinity, which facilitates charge separation and suppresses exciton recombination. The polymers, CNB-DOT-BDTF and CNB-T-DOT-BDTF, were designed to achieve complementary absorption with the Y6BO acceptor and evaluated in inverted PSCs with the structure ITO/ZnO/donor:Y6BO/MoO_3/Ag. The CNB-DOT-BDTF device achieved a superior PCE of 4.02%, outperforming CNB-T-DOT-BDTF (2.53%). The lower efficiency of the thiophene-bridged polymer is attributed to an upward shift of the HOMO energy level, resulting in less favorable energy alignment and reduced photovoltaic performance.

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PS1-030

Copolymer Engineering of BDTF-Based Donor Polymers toward High-Performance Polymer Solar Cells

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Polymer solar cells (PSCs) have emerged as promising photovoltaic technologies owing to their mechanical flexibility, lightweight nature, low fabrication cost, and compatibility with scalable solution-

processing techniques. Their photoactive layers are commonly based on bulk heterojunction architectures consisting of donor polymers and accepting materials. Enhancing PSC performance relies heavily on the rational molecular design of donor polymers, including backbone engineering and side-chain modification, to optimize key characteristics such as solubility, molecular organization, charge transport, and energy-level alignment. Among various building blocks, fluorinated benzodithiophene (BDTF) donor units combined with thiophene-dione-based acceptor moieties have demonstrated outstanding photovoltaic performance in non-fullerene PSCs employing Y6BO as the electron acceptor[1]. The systematic investigation starts with incorporating thiophene bridge to DOT-BDTF polymer for making (E)-1-(5-(4,8-bis(5-(3-ethylheptyl)-4-fluorothiophen-2-yl)-6-methylbenzo[1,2-b:4,5-b']dithiophen-2-yl)thiophen-2-yl)-5-((4,5-dioctylthiophen-2-yl)methylene)-3-(5-methylthiophen-2-yl)-4H-cyclopenta[c]thiophene-4,6(5H)-dione (T-DOT-BDTF)[2]. Furthermore, copolymerization of DOT-BDTF and T-DOT-BDTF was employed for making Poly(DOT-co-T-DOT-BDTF), to achieve precise control over the structural, physical, and electronic properties of the conjugated backbone. To evaluate their photovoltaic properties using devices structured as ITO/ZnO/Donor Polymer:Y6BO/MoO_3/Ag giving maximum PCE of 6.37%. The research explores D-A combinations to assess their impact on optoelectronic and photovoltaic performance, highlighting the potential of modifying thiophene-dione core units as acceptors in promising donor materials for advancing PSCs.

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PS1-031

Viologen Molecular Doping Enables Efficient Charge Transport and Reduced Recombination for High-Performance $MAPbI_3$ Perovskite Solar Cells

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Perovskite solar cells (PSCs) have attracted significant attention due to their outstanding photovoltaic performance and solution-processability [1].. Nevertheless, defect-induced charge recombination and carrier accumulation remain major obstacles to achieveing highly efficient devices [2].s. Therefore, two viologen derivatives, 1,1'-dibutyl-4,4'-bipyridinium dibromide (V-BB) and 1-butyl-1'-hexyl-4,4'-bipyridinium dibromide (V-BH), were introduced into $MAPbI_3$ perovskite films as molecular dopants. The effects of viologen incorporation on the photovoltaic properties and charge-transport characteristics of PSCs were investigated. As a result, the viologen-modified devices exhibited improved photovoltaic performance compared with the pristineundoped device. In particular, the V-BH treated device achieved a highest power conversion efficiency (PCE) of 19.6%, with an open circuit voltage (Voc) of 1.02 V, a short circuit current density (Jsc) of 24.9 mA cm^{-2}, and a fill factor (FF) of 77.2%, whereas the undopedcontrol device showed a PCE of 17.1%. In addition, the hysteresis index decreased from 7.60% to 3.06% following V-BH incorporation. Electrical analyses indicated enhanced charge collection and reduced recombination losses in the viologen-treated devices. These findings suggest that viologen

molecular doping is an effective approach for regulating carrier dynamics in $MAPbI_3$ perovskite solar cells and improving photovoltaic performance.

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PS1-035

Three-Dimensional Carbon-Based Microdevices with Surface-Normal Electrodes for Tunable Low-Voltage Joule Heating

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Realizing well-defined three-dimensional (3D) micro-architectures with integrated nanomaterials, while maintaining structural integrity and reliable electrical interfacing, remains a key challenge in microdevice engineering. Here, we report a 3D carbon-based microdevice combining a carbon nanotube/graphene nanoplatelet (CNT/GNP) network with surface-normal metal electrodes, fabricated via a paraffin-assisted dispersion[1] for tunable low-voltage Joule heating. Selective removal of the sacrificial paraffin matrix enhances electrical conductivity, while incorporating GNPs at an optimized content suppresses network shrinkage, yielding a stable, continuous carbon network. The surface-normal electrodes along the trench sidewalls enable uniform charge injection across the full depth of the carbon volume, unlike in-plane electrodes limited to surface contact. By controlling trench gap width and finger density, the device resistance is systematically tuned over a wide range, enabling a design-level trade-off between operating voltage and heating efficiency. The resulting micro-Joule heater reaches 147 °C at only 1.8 V, with long-term stability and mechanical robustness, and demonstrates wearable operation. This work establishes a versatile, low-voltage platform for application-tailored thermal management in compact microdevices.

[1] S. Joo, *et al.*, *Small*, **18**, 2106174 (2022).

PS1-037

Dual-Site Interfacial Regulation by Furan-Substituted Phosphine Oxide for Efficient Wide-Bandgap Perovskite Solar Cells

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Carrier recombination and inefficient charge extraction at the buried NiO_x/perovskite interface remain major obstacles for high-performance wide-bandgap (WBG) perovskite solar cells. Herein, we present a dual-site interfacial regulation strategy using tri-furyl phosphine oxide (TFPO) to simultaneously

engineer defect chemistry, crystallization behavior, and interfacial energetics. The electron-rich phosphoryl oxygen and furan oxygen atoms provide cooperative coordination with undercoordinated Pb^{2+} species, enabling effective suppression of interfacial nonradiative recombination. Meanwhile, TFPO modifies the surface energy and wettability of NiO_x, regulating perovskite nucleation and growth to produce highly crystalline films with enlarged grains and reduced grain-boundary density. The synergistic regulation of passivation, crystallization, and interfacial energetics results in reduced trap density, prolonged carrier lifetime, improved phase stability, and enhanced charge transport. Consequently, WBG perovskite solar cells achieve a power conversion efficiency of 21%, together with improved operational stability. This work highlights dual-site phosphine-oxide interfacial engineering as an effective strategy for realizing efficient and stable WBG perovskite solar cells.

[1] J. Heo, *et al.*, *Advanced Functional Materials*, **36**, e74668 (2026).

PS1-039

Probing Symmetry-Controlled Charge-Transfer State Formation in Y6-Derived Acceptors by Ultrafast Spectroscopy

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Controlling electron distribution is essential for tuning excited-state dynamics and charge-transfer processes in π-conjugated organic semiconductors. Here, we investigate symmetric YBO-2F and asymmetric A-YBO-2F to elucidate how molecular symmetry modulates electron distribution, thereby influencing excited-state relaxation and charge-transfer state formation. By combining steady-state optical spectroscopy, theoretical calculations, and ultrafast spectroscopic measurements, we correlate the electronic asymmetry of these acceptors with their excited-state dynamics. These findings highlight the role of electron-distribution symmetry in charge-transfer-state formation in these acceptors, providing molecular-level insight into the control of excited-state dynamics in π-conjugated organic semiconductors.

[1] M. Lim, *et al.*, *Chemical Engineering Journal*, **504**, 158769 (2025).

PS1-040

Effects of Impurity Removal on Thermoelectric Properties of Single-Walled Carbon Nanotubes with Different Tube Diameters

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Single-walled carbon nanotube (SWCNT) is one of the emerging thermoelectric materials. Herein, we assessed the effects of impurities (*e.g.*, iron catalysts and amorphous carbon (aC)) on thermoelectric

property of SWCNT films with varied tube diameters (0.9, 1.3, 1.5, and 1.7 nm). The aC impurity can be eliminated by sublimation. On the other hand, the iron impurities can be removed by gasification, according to the following equation:

$$Fe(s,l) + nFeCl_3(g) \rightarrow FeCl_n(g) + nFeCl_2(g)$$

For removing these impurities, raw SWCNT mats were heated with $FeCl_3$ powder at 800 °C under Ar flow for 20 min.

For the pristine samples (without purification), the Seebeck coefficient decreased with increasing tube diameter due to narrower bandgap while electrical conductivity did not show a clear trend. Upon purification, electrical conductivity increased for all samples whereas the Seebeck coefficient of SWCNTs with relatively small tube diameters (0.9 and 1.3 nm) decreased. Energy-dispersive X-ray spectroscopy revealed an increase in Cl content in these samples, suggesting that these tubes suffered from hole doping by $FeCl_3$ during the purification. For the larger-diameter samples (1.5 and 1.7 nm), the increase in electrical conductivity is attributed to improved carrier mobility because of the effective impurity removal.

[1] Saito *et al.*, *Carbon* **213**, 118207 (2023).

PS1-041

Wavelength-Operating Optoelectronic Memory Based on Internal Photochemical Reaction

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In conventional photovoltaic (PV) devices, the output characteristics generally follows the Shockley diode equation, where current density (*J*)-voltage (*V*) characteristics are predominantly influenced by photon density but not by wavelength. However, we recently found an anomalous wavelength-dependent photovoltage response in a TiO_2-incorporated PV device[1,2]. In this study, we propose a new concept of an optoelectronic memory based on the photochemical reaction at the interface of TiO_2 and organic photoabsorber. In addition, ″intermediate layer (IL)″ was introduced between TiO_2 and absorbing layer. We expect that controlling chemistry of IL by interfacial photocatalytic reaction by wavelength enable modulation of the output signal. The electronic state of IL is reduced by UV irradiation and oxidized by visible light irradiation, leading to a change in its photoconductivity. We successfully demonstrate a memory device that enables writing, reading, and erasing through irradiation with UV, visible light under short-circuit condition, and visible light under open-circuit condition, respectively. Our study presents a new strategy for next generation optoelectronic memory, which contributes to the development of in-memory sensing, edge-AI, and photonic computing.

[1] T. Kobayashi, R. Nishikubo, Y. Chen, K. Marumoto, A. Saeki, *Adv. Funct. Mater.* **2024**, *34*, 2311794.
[2] T. Kobayashi, R. Nishikubo, Y. Tomiyori, F. Ishiwari, D. Asakura, E. Hosono, M. Kitamura, H. Kiuchi, Y. Harada, A. Saeki, *Adv. Funct. Mater.* **2026** *in press*, DOI: 10.1002/adfm.76809.

PS1-042

Urea-Based Additive-Induced Crystallinity Enhancement in Sequentially Evaporated $CsFAPbI_3$

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Sequential vacuum evaporation has emerged as a promising approach for fabricating perovskite solar cells (PSCs) owing to its excellent film uniformity, reproducibility, and compatibility with scalable manufacturing. However, the efficiency of vacuum-deposited PSCs remains limited by poor control over precursor crystallization and defect formation during film growth. Here, we report a vacuum-compatible additive engineering strategy that tailors the crystallization of the inorganic precursor layer through the incorporation of propylene urea (PU), a Lewis base additive, during the co-evaporation of PbI_2 and CsI. Subsequent deposition of formamidinium iodide (FAI) and thermal annealing yielded highly crystalline perovskite films. Structural characterization revealed that PU promotes the crystallinity and (00l) preferred orientation of the inorganic precursor, which is effectively inherited by the perovskite layer. As a result, devices incorporating PU-treated inorganic layers achieved enhanced photovoltaic performance, delivering a JSC of 23.37 mA cm^{-2} and a PCE of 17.17%, compared with 20.31 mA cm^{-2} and 15.98% for the control devices. This work highlights crystallization control of the inorganic precursor as a key design principle for overcoming the limitations of sequential vacuum deposition and advancing high-performance vacuum-processed PSCs.

PS1-043

Enhanced Touch Sensitivity of Flexible PDMS-Based Fringe-Field Capacitive Sensors Using an Electrically Floating Conductive Layer

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Fringe-field capacitive touch sensors are attractive for flexible and wearable electronics because of their simple structure, low power consumption, and compatibility with soft materials and flexible substrates.[1] However, achieving high touch sensitivity remains challenging, with the relatively low dielectric permittivity of polymer dielectrics such as polydimethylsiloxane (PDMS) being one of the limiting factors. In this work, we present an effective approach for enhancing the touch sensitivity of flexible PDMS-based fringe-field capacitive sensors by introducing an electrically floating conductive layer on the dielectric surface. The conductive layer modifies the electric field distribution and capacitive coupling during touch, leading to a larger touch-induced capacitance change. To validate the proposed strategy, the effects of conductive material, film thickness, and conductive layer configuration were systematically investigated. For a sensor employing a 250 μm interdigitated electrode, introducing the floating conductive layer more than doubled the touch-induced capacitance change (0.85 to 2.0 pF) while increasing the initial capacitance from 2.0 to 3.4 pF. Across all conductive materials and layer configurations, the proposed design consistently enhanced the touch response compared with the sensor without a conductive layer. These results demonstrate that a floating conductive layer is an effective strategy for improving flexible fringe-field capacitive touch sensors.

[1] A. J. Cheng, *et al.*, *Advanced Materials Technologies*, **8**, 2201959 (2023).

PS1-045

Crystal Structures and Proton Dynamics in Chiral DABCO–Camphoric Acid Cocrystals

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Chirality has attracted significant attention as a new controlling factor for molecular and ionic dynamics in liquid crystals and plastic crystals.[1] On the other hand, a spherical base 1,4-diazabicyclo[2.2.2]octane (= **DABCO**) has attracted attention because of its dielectric functionalities based on proton hopping/molecular rotational dynamics in response to an external electric field.[2] In this study, we focused on co-crystals composed of **DABCO** and chiral camphoric acid (**HCA**), (= (**HDABCO**$^+$)(**CA**$^-$), and investigated the dielectric properties of their homochiral (1*R*-) and racemic (*rac*-) co-crystals. Single-crystal X-ray structural analysis revealed that both crystals form 1D hydrogen-bonded chains with low energy barriers, with the hydrogen-bond length being slightly shorter in the racemate than in the 1*R*-salt. The temperature and frequency dependence of the complex permittivity parallel to the hydrogen-bonding direction in a single crystal (**HDABCO**$^+$)(1*R*-**CA**$^-$) revealed a dielectric relaxation reflecting the proton fluctuations in the low-barrier hydrogen bonds (**Fig. 1**). Detailed analysis of the observed dipolar dynamics and the effects of chirality on the dynamics are discussed.

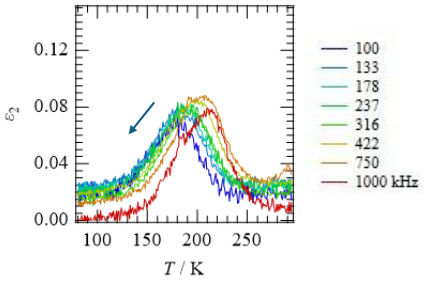

Fig. 1 Temperature dependence of the ε_2 of single-crystal (**HDABCO**$^+$)(1*R*-**CA**$^-$) parallel to the hydrogen-bonding direction.

[1] C. Sato *et al.*, *J. Am. Chem. Soc.*, **2024**, *146*, 22699. [2] A. Katrusiak *et al*., *Phys. Rev. Lett.*, **1999**, *82*, 576.

PS1-046

Molecular Design of Polymer Electrolytes with Tailored Mechanical Properties for Lithium Metal Batteries

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Lithium metal batteries (LMBs) have attracted significant attention due to their high theoretical energy density, but stability and interfacial issues still limit practical application. Polymer-based electrolytes offer advantages such as non-flammability and improved interfacial compatibility; however, their intrinsic mechanical weakness leads to permanent deformation and interfacial detachment under repeated lithium plating/stripping-induced volume fluctuations. In this study, we developed a molecular design strategy to engineer the mechanical properties of polymer-based electrolytes for improved durability under repeated lithium plating/stripping-induced volume expansion and contraction. The

designed electrolyte maintains ionic conductivity without significant change while effectively preserving structural integrity, maintaining interfacial adhesion, and minimizing mechanical degradation during continuous deformation, enabling stable long-term battery operation. This work highlights mechanical property engineering as a critical design principle for practical high-energy-density lithium metal batteries.

PS1-048

AI-assisted Analysis of In-situ Spectroscopy for Understanding Perovskite Crystallization and Film/Device Properties

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Lead perovskite solar cells (PSCs) are attracting attention as next generation solar cells. However, their highly complex mechanism of film formation, which involves nucleation, crystal growth, defect formation and elimination, hinders the production of high-quality films under precise control. In addition, the performance and durability of PSCs are influenced by the composition of materials and additives, as well as surrounding environment. In this viewpoint, in-situ spectroscopy is a powerful method to study crystallization mechanism[1,2]. Herein, we introduce a simultaneous in-situ photoabsorption (PA) / photoluminescence (PL) measurement system combined with machine-learning to enable the analysis of correlation between crystallization behavior and film quality, as well as device characteristics. We fabricated I/Br-mixed PSCs of $FA_{0.95}Cs_{0.05}PbI_3$, $FA_{0.95}Cs_{0.05}Pb(I_{0.85}Br_{0.15})_3$ and $FA_{0.95}Cs_{0.05}Pb(I_{0.7}Br_{0.3})_3$. The changes in transient PA and PL spectra allow us to observe nucleation, crystal growth, and particle coalescence behavior. As a result, the features from the in-situ PA/PL at the initial stage of crystallization (during spinning and first 5 min of annealing) exhibited significant correlation with grain size, uniformity, and device property Our in-situ spectroscopy with AI-driven analysis clarifies deep insight into the mechanism of high-quality film formation.

[1] Y. Park, R. Nishikubo, M. Pylnev, R. Shimomura, A. Saeki, *ACS Appl. Energy Mater.* **2024**, *7*, 11818.
[2] H. Luo, R. Nishikubo, R. Shimomura, M. Pylnev, A. Saeki, *ACS Appl. Energy Mater.* **2026**, *9*, 5255.

PS1-049

Fabrication of Ag Nanomesh Structures Using Nanosphere Lithography with Oxygen Plasma Treatment for Wavelength Selective Electrode

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Metal nanomesh structures are promising transparent electrodes and optical control structures for organic light-emitting diodes (OLEDs) because of their conductivity and wavelength-selective transmission. In this study, Ag nanomesh structures were fabricated by nanosphere lithography using oxygen-plasma-treated polystyrene (PS) beads, and their optical and emission enhancement properties were investigated.

A monolayer of 500-nm-diameter PS beads was formed on a quartz substrate and exposed to oxygen plasma to reduce the bead size. Ag films were deposited by vacuum evaporation, and Ag nanomesh structures were fabricated through a lift-off process. Morphology was characterized by SEM and AFM, while the transmission and photoluminescence (PL) spectra were measured using Alq_3-coated Ag nanomesh samples.

The PS bead diameter was reduced from 500 nm to 300–380 nm by oxygen plasma treatment. Continuous plasma exposure caused alignment disorder, whereas irradiation with intervals maintained the ordered arrangement. Periodic Ag nanomesh structures were successfully fabricated using the processed bead arrays as templates. The fabricated nanomesh exhibited wavelength-selective transmission characteristics distinct from those of a continuous Ag film. Furthermore, the PL intensity of Alq_3 deposited on the Ag nanomesh increased by up to four times. These results demonstrate the potential of Ag nanomesh structures for plasmon-enhanced emission control applications.

[1] M. Ugajin et al., Surf. Coat. Technol., 435, 128258 (2022)

PS1-151

Thienoquinoid-based Acceptors with Short-Wavelength Infrared Absorption for Organic Photodetectors

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Organic photodetectors (OPDs) based on organic semiconductors, particularly non-fullerene acceptors (NFAs), with short-wavelength infrared (SWIR) absorption have attracted considerable attention owing to their high external quantum efficiency and ease of extending absorption to longer wavelengths. A typical molecular design strategy to extend absorption into the SWIR region is to enhance intramolecular donor–acceptor (D–A) interactions. However, the absorption edge often remains near 1200 nm, and the elevated HOMO energy level limits donor material selection because of the required HOMO–HOMO energy offset for charge separation. Therefore, new molecular designs are required to achieve SWIR absorption while maintaining a low HOMO energy level. [1,2]

In this study, four thienoquinoid (TQ)-based NFAs incorporating thienothiophene-dione (TTD) and benzodithiophene-dione (BDTD) were synthesized. The BDTD unit stabilizes the quinoidal resonance through its aromatic form, enabling SWIR absorption and a rigid molecular backbone. Thin-film absorption edges reached the SWIR region; notably, BDTD2 absorbed beyond 1500 nm. Transient absorption measurements revealed that, despite its more red-shifted absorption, BDTD2 exhibits a longer exciton lifetime than BDTD1, perhaps attributed to smaller bond-length alternation from enhanced resonance stabilization. OPD devices demonstrated SWIR sensitivity with relatively high D^* values on the order of 10^{12}. These results suggest that TQ units represent a promising strategy for developing SWIR-absorbing NFAs with long exciton lifetimes.

[1] *J. Mater. Chem. C*, **2014**, *2*, 2307.
[2] *J. Am. Chem. Soc.* **2016**, *138*, 7725.

PS1-152

Dynamic Mechano-Optical Reflection in Main-Chain Chiral Nematic Liquid Crystal Elastomers

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Flexible strain sensors capable of visualizing mechanical deformation are attracting considerable attention for applications in soft robotics, wearable electronics, and healthcare. Chiral nematic liquid crystal elastomers (N* LCEs) are promising candidates because they exhibit wavelength-selective Bragg reflection, which changes in response to mechanical deformation through variation of the helical pitch. [1] While side-chain N* LCEs have been extensively investigated, their optical response often suffers from limited mechanical stability during repeated deformation. [2] In this study, we prepared main-chain N* LCE films and investigated their dynamic mechano-optical reflection behavior. Upon uniaxial stretching to 50% strain, the reflection color reversibly shifted from orange to blue, corresponding to compression of the helical pitch. During stress relaxation, the reflected wavelength gradually recovered with time, revealing the dynamic structural response of the main-chain network. Furthermore, lamination with a polydimethylsiloxane (PDMS) elastomer effectively stabilized the optical response by suppressing relaxation of the reflected wavelength. These results demonstrate that the combination of a main-chain N* LCE architecture and PDMS lamination provides an effective strategy for improving the stability of mechano-optical photonic materials.

[1] H. Finkelmann, *et al.*, *Adv. Mater.*, **13**, 1039 (2001).
[2] K. Hisano, *et al.*, *Adv. Funct. Mater.*, **31**, 2104702 (2021).

PS1-153

Development of Semiconducting Polymers Based on Dithiazolonaphthobisthiadiazole for Organic Photovoltaics

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The development of high-performance semiconducting polymers is important for improving the power conversion efficiency (PCE) of organic photovoltaic (OPV). In OPVs, semiconducting polymers are required to exhibit both high charge transport properties and deep HOMO energy levels to maximize photovoltaic parameters. To achieve these characteristics, the introduction of electron-deficient building unit based on highly extended π-conjugated systems with nature is an effective strategy. Recently, we developed semiconducting polymers based on a six-membered-ring-fused unit, dithienonaphthobisthiadiazole (TNT), which features high backbone rigidity and excellent charge transport properties. As a results, OPVs based on these polymers achieved high PCEs exceeding 18%.[1,2,3]

In this study, we designed and synthesized a new building unit, dithiazolonaphthobisthiadiazole (TzNT), in which the thiophene moieties of TNT are replaced with thiazole moieties. The TzNT-based polymer, PTzNT1-H exhibited a deep HOMO energy level, which is attributed to the enhanced electron deficiency due to the electron-withdrawing imine-type nitrogen, compared with TNT-based counterpart, PTNT1-H. Furthermore, PTzNT1-H showed higher crystallinity in thin films owing to its rigid and coplanar backbone originating from noncovalent intramolecular interactions. The synthesis, OPV performances, and detailed structure–property relationships will be discussed in the presentation.

[1] T. Mikie, I. Osaka, *et al*., *Chem. Sci*., **2024**, *15*, 19991–20001.
[2] S. Suruga, T. Mikie, I. Osaka, *et al*., *Commun. Mater*., **2026**, *7*, 79.
[3] T. Mikie, I. Osaka, *et al*., *Chem. Sci*., **2026**, accepted.

PS1-154

Detection of Food Spoilage-Related Amine Compounds via Conductivity Changes in a Conjugated Polymer

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Food spoilage generates volatile basic compounds, including ammonia and biogenic amines, which can serve as useful indicators of food freshness. Among these compounds, ammonia is produced during the decomposition of nitrogen-containing food components and is therefore an important target for spoilage monitoring. Conventional ammonia detection methods often require complex instrumentation and lengthy analytical procedures. Thus, a simple sensing platform that converts ammonia exposure into a measurable conductivity change is desirable for rapid food-quality monitoring.
In this study, the NDI-based conductivity polymer was used as a sensing material for ammonia detection. The electrical current increased with increasing ammonia concentration, indicating a concentration-dependent enhancement in conductivity. Spectroscopic analyses showed no significant structural or electronic changes, suggesting that the conductivity change was not mainly caused by permanent chemical modification. Instead, the response was attributed to interfacial ion accumulation and an electric-double-layer-transistor-like electrostatic gating effect. The polymer also exhibited measurable conductivity changes upon exposure to volatile compounds generated from spoiled food samples. These results demonstrate the potential of NDI-based polymer as a conjugated-polymer-based sensing material for monitoring food spoilage through ammonia-induced conductivity changes.

PS1-155

Clarification of Material Effects in Droplet-Based Electricity Generators Using Time-Integrated Charge and Energy Analysis

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Droplet-based electricity generators (DEGs) have attracted attention as simple energy-harvesting devices utilizing charge transfer and electrostatic induction at liquid–solid interfaces. Their performance is commonly evaluated using open-circuit voltage, short-circuit current, or capacitance-based charge estimations. However, because DEG output is generated through transient and discrete droplet events, these metrics do not necessarily represent the total electrical output delivered to an external circuit.

In this study, we propose a time-resolved evaluation method based on direct integration of measured current and power waveforms. The transported charge and generated electrical energy are determined by $Q = \int I(t)dt$ and $E = \int V(t)I(t)dt$, respectively, enabling output characterization without assumptions regarding capacitance, contact geometry, or electrostatic models.

Experiments were conducted using fluoropolymer and silicone-based dielectric materials, including PTFE and PDMS. The proposed approach enables direct comparison of charge transport characteristics among different materials. The results show that voltage-based metrics alone cannot fully describe DEG performance, whereas time-integrated charge and energy provide clearer distinctions between dielectric

materials. These findings indicate that DEG output depends not only on charge accumulation but also on dynamic charge transport during droplet contact and separation.

PS1-158

Dibenzofuran-Incorporated Hole Transport Materials with High Bond Dissociation Energy for Efficient and Long-Lived Quantum Dot Light-Emitting Diodes

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Quantum dot light-emitting diodes (QLEDs) have attracted significant interest for display and lighting applications because of their precise color tunability, high color purity, and high luminance efficiency. However, their efficiency and operational lifetime remain limited by the lack of hole transport materials (HTMs) that simultaneously provide efficient hole transport, strong electron blocking, and intrinsic electrical robustness. Conventional polymeric HTMs suffer from shallow highest occupied molecular orbital levels, insufficient electron-blocking capability, and weak phenyl–nitrogen bonds that dissociate under electrical stress. Here, we designed and synthesized a series of dibenzofuran-incorporated polymeric HTMs with enhanced bond dissociation energy (BDE).[1] Computational and experimental analyses show that dibenzofuran incorporation enables deeper highest occupied molecular orbital levels, improved hole transport, and higher BDE. Among them, poly(9,9-dioctylfluorene-co-N,N-diphenyldibenzo[*b*,*d*]furan-1-amine) (1-PFDBF) exhibits the most balanced properties, including high hole mobility, reduced energetic disorder, suppressed interfacial charge transfer, and low trap density. Solution-processed green QLEDs employing 1-PFDBF achieve a maximum external quantum efficiency of 25.71%, current efficiency of 102.98 cd A^{-1}, power efficiency of 75.69 lm W^{-1}, and a turn-on voltage of 2.25 V. The devices further exhibit an estimated T_{50} of ≈1,456,000 h at 100 cd m^{-2}.

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PS1-160

Chloride-Mediated Crystallinity Control in Two-Dimensional Tin Halide Perovskite Transistors

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Tin(II) halide perovskites are lead-free candidates for p-type thin-film transistors (TFTs), but their fast crystallization during solution processing often produces non-uniform films and limits device reproducibility. This work examines the use of chloride additives to control the film formation of phenethylammonium tin iodide (PEA_2SnI_4). Among methylammonium chloride (MACl), formamidinium chloride, and phenethylammonium chloride, MACl gives the clearest improvement in film morphology and transistor performance. We find that MACl interacts with the perovskite precursors to form intermediate complexes in the solution and in the as-deposited film, which slows premature crystallization before annealing. This modified crystallization pathway leads to larger grains, fewer pinholes, lower roughness, and reduced defect-related charge trapping. When used as the channel layer in bottom-gate, top-contact TFTs, MACl-treated PEA_2SnI_4 shows an approximately threefold increase in field-effect mobility and an improved on/off current ratio compared with pristine film. These results indicate that chloride additives can provide a simple route to improving the processing and charge transport of Sn(II)-based perovskite semiconductors for electronic devices.

PS1-161

Highly Stretchable Bulk Heterojunction Thin films for Organic Photodetectors

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Despite the efficient photoinduced charge generation capability of bulk heterojunction (BHJ) thin films composed of polymeric electron donors and small-molecule electron acceptors, the intrinsic brittleness of small-molecule electron acceptors remains a major challenge for realizing highly stretchable organic photodetectors (OPDs).[1] In this work, we developed highly stretchable BHJ thin films by blending newly designed semiconducting polymer electron donors with the fullerene acceptor [6,6]-phenyl-C_{71}-butyric acid methyl ester ($PC_{71}BM$). The polymer donors were synthesized with precisely controlled molecular architectures to simultaneously achieve efficient charge transport and enhanced mechanical compliance.[2] Consequently, the BHJ thin films exhibited excellent mechanical deformability with stretchability exceeding 100% while maintaining efficient photoresponse characteristics. OPDs fabricated from these BHJ thin films demonstrated high responsivity and specific detectivity under zero-bias operation together with excellent mechanical robustness. The combination of optoelectronic performance and stretchability is attributed to favorable nanoscale phase-separated morphologies that promote efficient charge generation and transport while effectively accommodating mechanical strain despite the presence of the intrinsically brittle $PC_{71}BM$ electron acceptors.[3] These results demonstrate that precise molecular engineering of semiconducting polymer donors provides an effective strategy for developing highly stretchable BHJ systems for next-generation deformable optoelectronic devices.

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PS1-162

Odd-Even Alkyl Spacer Engineering of 2D Dion-Jacobson Tin Perovskites for High-Performance p-Type Transistors

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Two-dimensional (2D) tin perovskites are promising p-type semiconductors, owing to their bulky hydrophobic organic spacers that lead to improved ambient stability. In particular, Dion-Jacobson (DJ) tin perovskites comprise divalent diammonium spacers that form strong hydrogen bonds with adjacent inorganic layers, providing both structural rigidity and enhanced charge transport. In this study, we investigated 2D DJ tin perovskites with varying linear alkyl diammonium spacers H_3N-$(CH_2)_m$-NH_3 (m = 3–8) to clarify how spacer parity, chain length, and precursor stoichiometry govern phase formation and transistor performance. Film analysis showed that even-numbered spacers (m=4,6,8) preferentially form well-ordered layered structures while odd-numbered spacers (m=3,5,7) formed lower-dimensional structures. Nevertheless, it was possible to manipulate perovskite dimensionality by tuning precursor stoichiometry. Notably, 1,5-pentanediammonium tin iodide ($PenDASnI_4$) exhibited diffraction features consistent with a quasi-3D structure. Among the even-numbered spacers, 1,4-butanediammonium tin iodide ($BDASnI_4$) displayed the most efficient charge-transport when applied to thin film transistor (TFT) devices. Further interface engineering of $BDASnI_4$ TFTs with the self-assembled monolayer [2-(3,6-diiodo-9H-carbazol-9-yl)ethyl]phosphonic acid (I-2PACz) yielded enhanced film crystallinity and TFT device performance, including reduced dual-sweep hysteresis, subthreshold swing, and a high field-effect mobility value of 1. 45 $cm^2V^{-1}s^{-1}$.

PS1-163

Thermal-Gradient-Driven Assembly of Hollow MOF Superlattices into Co Single-Atom Carbon Electrocatalysts

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Developing spatially ordered carbon electrocatalysts with accessible atomic metal sites is critical for accelerating the oxygen reduction reaction in metal–air batteries. Yet, large-area 2D-ordered architectures remain difficult to realize because MOF building blocks readily lose directional alignment and structural integrity during assembly and carbonization. Here, we report an edge-confined, thermal-gradient-driven assembly strategy that organizes hollow MOF nanopolyhedra into macroscopically aligned arrays and converts them into hierarchical hollow carbon frameworks containing atomically dispersed Co sites. The imposed thermal gradient regulates freezing-front propagation, enabling anisotropic packing while preserving long-range order after carbonization. The resulting catalyst offers abundant accessible active sites, continuous electron pathways, and open mass-transport channels, thereby delivering excellent ORR activity, durability, and high-performance Zn–air battery operation.

PS1-164

Functionalized PEDOT:PSS Engineered Double Layer Aerogel for Efficient Solar-driven Desalination

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Potable water scarcity has become an urgent global challenge. In this work, we developed an all-organic bilayer porous aerogel for solar-driven seawater desalination, composed solely of agarose (AG), cellulose nanofibers (CNF), and PEDOT:P(SS-co-PAA) (PPPA). The fabrication process does not require carbonization, offering the advantages of rapid and facile fabrication. It was observed that the upper and lower layers remained integrated as a single channel, allowing smooth and continuous water transport. The upper PPPA@CNF@AG layer was designed to be thin to ensure efficient photothermal conversion, while the lower CNF@AG layer possesses low thermal conductivity to minimize heat loss. To enhance structural stability, poly(acrylic acid) (PAA) was introduced as a copolymer into the PSS chains of PEDOT:PSS, forming PEDOT:P(SS-co-PAA). The hydroxyl groups of PAA, AG, and CNF participate in cross-linking, creating a robust structure that prevents PEDOT:PSS from leaching during desalination. As a result, the bilayer aerogel exhibited a stable evaporation rate of 2.55 kg m−2 h−1 under 1 sun illumination.

PS1-165

Electron-Conductive Binders for Silicon Anodes in 5 MPa All Solid-State Batteries

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Although silicon electrodes without solid electrolytes can form an integrated lithiation structure in situ while minimizing side reactions, their poor performance under low operating pressures remains a significant challenge for all-solid-state batteries (ASSBs). In this study, we propose poly(3,4-ethylenedioxythiophene):poly((styrene sulfonic acid)x-co-(maleic acid)y) (PEDOT:P(SSx-co-MAy)) (PPMA) as an electrically conductive binder that is highly scalable, fluorine-free, and processable via aqueous methods. This binder provides sufficient electrical conductivity to eliminate the need for carbon additives while ensuring strong adhesion and electrochemical stability—unlike conventional liquid electrolyte systems. Off-site measurements revealed that electronic connectivity was disrupted during the delithiation process at 5 MPa; however, this issue was resolved by using PPMA. Si electrodes containing PPMA exhibit significantly superior performance compared to conventional electrodes containing polyvinylidene fluoride, as demonstrated in the Si|Li6PS5Cl|(Li-In) half-cell and the $LiNi_{0.70}Co_{0.15}Mn_{0.15}O_2|Li_6PS_5Cl|Si$ full cell under conditions of 30 °C and 5 MPa, achieving a capacity retention of 86% and a capacity of 134 mAh g^(−1) after 100 cycles. Finally, a 233 mAh pouch-type $LiNi_{0.83}Co_{0.12}Mn_{0.05}O_2$||Si ASSB was demonstrated, highlighting PPMA′s potential as a practical binder platform for high-energy ASSBs.

PS1-166

Tuning Supramolecular Handedness in Chiral Non-Fullerene Acceptors for NIR CPL Detection

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Realizing efficient near-infrared (NIR) circularly polarized light (CPL) photodetectors has been hindered by the weak long-wavelength absorption and limited charge transport typical of chiral organic semiconductors.[1] Here, we show that the handedness of solid-state assemblies formed by enantiopure Y6-type non-fullerene acceptors (NFAs) can be tuned by combining end-group halogenation with thermal annealing. Fluorine- and chlorine-terminated derivatives display markedly different thermal behavior: the fluorinated system undergoes continuous structural reorganization with increasing temperature, transforming from a disordered three-dimensional stacking motif into a highly ordered two-dimensional arrangement, whereas the chlorinated counterpart reaches a stable configuration once annealed above 150 °C. This contrast allows both the sign and magnitude of the circular dichroism signal to be systematically controlled. The fluorinated derivative in particular reaches an absorption dissymmetry factor of approximately 0.1 after high-temperature annealing. Incorporating the optimally annealed films into Schottky-barrier vertical organic field-effect transistors yielded NIR CPL photodetectors with a photocurrent dissymmetry factor of ~0.1, specific detectivity of 4.9×10^{11} Jones, external quantum efficiency above 900%, and response times near 600 μs at 850 nm. These findings establish annealing-controlled supramolecular chirality as an effective strategy for advancing chiral optoelectronic devices.[2]

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PS1-167

Electrolyte-Dependent Ion Trapping and Synaptic Responses in OMIECs-Based Organic Electrochemical Diodes

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Organic mixed ionic–electronic conductors (OMIECs) are promising materials for electrochemical devices, as their coupled ionic and electronic transport enables ion-driven electrochemical doping and allows OMIEC-based devices to mimic key features of biological synaptic behavior. In this study, we

investigated the electrolyte-dependent ion-trapping properties of OMIECs in aqueous electrolytes and ionic liquids. The two electrolyte systems produced different ion-trapping and relaxation behaviors in the active channel, leading to distinct charge modulation and retention characteristics. Furthermore, OMIEC-based two-terminal organic electrochemical diode (OECD) devices were fabricated and tested under different electrolyte conditions in order to relate these properties to device operation. Depending on electrolytes, the devices showed different synaptic responses, including long-term potentiation and short-term potentiation. Finally, *in-operando* measurements revealed structural changes in the OMIEC channel during operation, suggesting that electrolyte-dependent ion trapping governs the coupling among electrochemical modulation, structural evolution, and synaptic behaviors.

PS1-168

UV-Crosslinked Azide-Functionalized Semiconducting Carbon Nanotube Thin Films with Enhanced Stretchability

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Stretchable semiconducting single-walled carbon nanotube (SWCNT) networks have attracted considerable attention for next-generation wearable and deformable electronics. However, further improving their mechanical robustness and stretchability while maintaining high semiconducting purity remains a significant challenge. In this work, we introduce a conjugated polymer bearing azide functional groups that selectively wraps semiconducting SWCNTs, allowing them to be separated from metallic tubes and assembled into networks of high semiconducting purity. After the material is coated onto elastomeric substrates, exposure to ultraviolet (UV) light activates the azide groups, generating reactive nitrene intermediates. These nitrenes drive covalent bond formation both at SWCNT−SWCNT junctions and across the SWCNT−substrate interface, producing an interconnected network that adheres strongly to the underlying elastomer. As a result, the UV-crosslinked thin films exhibit markedly greater stretchability than their non-crosslinked counterparts, as confirmed through film-on-elastomer testing. We attribute this improved stretchability to the formation of covalent linkages at the SWCNT−SWCNT and SWCNT−substrate interfaces. Taken together, our results demonstrate that combining azide-functionalized polymer wrapping with UV-induced crosslinking provides a versatile and effective route to simultaneously obtain highly purified semiconducting SWCNT networks and mechanically robust materials for stretchable electronics.

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PS1-169

Improving the Efficiency and Thermal Stability of Organic Solar Cells via Self-Doped Perylene Diimide-Based Polymeric Electron Transport Layers

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Electron transporting layers (ETLs) play a crucial role in determining both the photovoltaic performance and operational durability of organic solar cells (OSCs).[1] While substantial efforts have been devoted to developing ETLs that enhance device efficiency, their contribution to thermal stability has been comparatively less explored. In this study, we introduce two perylene diimide-based ETL polymers, PPV and PPA, in which PDINN-derived units are connected through vinyl and ethynyl linkers, respectively. Among the synthesized polymers, PPV-M exhibits the highest performance, yielding power conversion efficiencies of 18.45% in D18:Y6-BO devices and 16.97% in PM6:BTP-eC9 devices. These values exceed those obtained from the corresponding PDINN-based devices, which show efficiencies of 17.79% and 16.85%, respectively. More importantly, PPV-M markedly improves thermal durability under aging at 65 °C, extending the T_{80} lifetime to 637 h compared with only 8 h for PDINN-based devices. The superior thermal stability is attributed to the polymeric architecture of PPV-M, which has a higher glass transition temperature than small molecule PDINN. These features effectively limit thermally driven molecular migration at the interface. Overall, this work highlights polymerization of electron transporting molecular units as a practical strategy for simultaneously improving efficiency and thermal stability in OSCs.

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PS1-170

Efficient covalent functionalization of multi-walled carbon nanotubes in a flow reactor

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Multi-walled carbon nanotubes (MWCNTs) have excellent electrical, thermal, and mechanical properties but tend to aggregate, limiting processability and making surface functionalization essential. Conventional batch methods suffer from low and non-uniform functionalization due to mass-transfer limits and MWCNT aggregation. Here, we demonstrate the first covalent functionalization of MWCNTs in a multiphase flow system using a packed-bed flow reactor (PBR). Aryl radical grafting of 4-bromoaniline was performed with isopentyl nitrite as initiator under varied injection sequence, time (1–

3 h), temperature (60–80 °C), and concentration (0.42–1.72 M). Pre-mixing the reactant solutions outside the PBR to generate radicals before injection—rather than co-packing 4-bromoaniline with MWCNTs—eliminated channeling and greatly improved efficiency. Under optimized conditions (70 °C, 1.72 M, 1 h), functionalization reached 5.70 wt% by TGA, a 2.11-fold gain over the optimized batch result (2.70 wt%, 8 h). XPS confirmed this, with a peak Br concentration of 2.81%. Functionalization was tunable from 1.81–5.70 wt%, with good reproducibility (TGA RSD 0.09%, XPS RSD 6.51%). These results establish packed-bed flow synthesis as an efficient, controllable, and scalable platform for CNT surface engineering.

PS1-171

Contact Engineering of Se-alloyed TeOx Thin-Film Transistors Using a Tellurium Interlayer

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Efficient hole injection at the source/drain contacts remains a key challenge in p-type oxide-semiconductor thin-film transistors, particularly when the source/drain interface contains oxygen-related unfavorable interfacial states that impede efficient hole injection.[1,2] In this work, we investigate a contact-engineering strategy for selenium-alloyed tellurium oxide (Se-alloyed TeOx) thin-film transistors by introducing a tellurium (Te) interlayer between the metal source/drain electrodes and the Se-alloyed TeOx channel. The Te interlayer is designed to form a Te-rich, oxygen-deficient contact interface, thereby reducing interfacial disorder and suppressing the injection barrier without altering the main channel composition.[3] Compared with reference devices without the interlayer, Te-interlayer devices exhibit improved output characteristics, enhanced on-state current, and reduced contact-limited behavior, indicating more efficient carrier injection at the source/drain contacts. The results suggest that chemically compatible chalcogenide interlayers can effectively modulate the metal/oxide-semiconductor interface and provide a simple route to lowering contact resistance in p-type TeOx-based electronics.[4,5] This study highlights the importance of interfacial composition control for realizing high-performance oxide-semiconductor devices with scalable contact architectures.

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PS1-172

Defect-Engineered Flexible MoS_2, WS_2 and WSe_2 Optoelectronic Synapse Arrays via Vacuum Filtration Patterning

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Optoelectronic synapses capable of detecting and retaining optical inputs are key components for artificial vision or neuromorphic visual systems. However, most organic optoelectronic synapses suffer from limited durability and low photoresponse, hindering their practical use. In this study, we present a flexible 2D material-based optoelectronic synapse array fabricated using polyimide (PI) shadow mask-assisted vacuum filtration with liquid-exfoliated 2D materials (MoS_2, WS_2 and WSe_2). This vacuum filtration patterning method eliminates the need for direct lithography and etching on 2D layers, thereby preventing structural damage and enabling cost-effective fabrication. Compared to other solution processes such as spin-coating or drop-casting, vacuum filtration patterning achieves uniform 2D material films without edge-bead effects. The patterned arrays can be readily transferred onto various flexible substrates including PI and parylene C via a polydimethylsiloxane (PDMS) stamp-assisted transfer. The resulting flexible optoelectronic synapse arrays exhibit defect-trap-induced synaptic behaviors, such as short- and long-term plasticity and can respond to optical pulse patterns and retain photonic memory. These capabilities enable in-sensor processing for real-time decision-making of optical data, showing promise for dynamic image analysis, gesture recognition, or environmental monitoring. This work establishes a simple fabrication of flexible 2D optoelectronic synapses, bridging scalable patterning and neuromorphic functionality for next-generation visual sensors.

PS1-173

Robust Biodegradable Synapse with Sub-Biological Energy and Extended Memory for Intelligent Reflexive System

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Biodegradable artificial synapses hold great promise for sustainable neuromorphic electronics,[1] yet combining long-term memory, ultralow energy consumption,[2] and mechanical robustness[3] remains challenging. Here, we report a fully biodegradable multilayer artificial synapse (M-AS) composed of crosslinked chitosan−guar gum (CS−GG) ion-active layers (IALs) and a cellulose acetate (CA) ion-binding layer (IBL). This trilayer architecture enhances ion trapping via ion-dipole coupling (IDC) at the IAL−IBL interface, while hydrogen-bonded crosslinking within the CS−GG matrix enhances mechanical and environmental stability.[4] Sodium chloride, embedded in the IALs, serves as a mobile ionic species analogous to biological neurotransmitters, enabling low-voltage ion migration. Upon electrical stimulation, ion migration and dipole alignment induce IDC, leading to partial ion retention and cascade-like postsynaptic current responses that support memory formation. The M-AS supports key synaptic functionalities under sub-millivolt operation. It achieves the longest long-term memory time (5944 s) reported among biodegradable artificial synapses and an energy consumption (0.85 fJ/event) lower than that of biological synapses. Integration with a thermistor and robotic actuator enables a bioinspired reflexive system capable of adaptive, stimulus-dependent learning and reflex-like behaviors. These results demonstrate the potential of M-AS for low-power, intelligent human−machine interfaces.

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PS1-174

A Real-Time, Non-Contact Photothermal Data Acquisition Platform Integrating Automated Temperature Measurement and Thermal Imaging

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Efficient photothermal characterization requires the simultaneous acquisition of accurate temperature profiles and spatial thermal images. However, conventional setups rarely integrate these two components into a single real-time monitoring system. To address this limitation, we developed a real-time, non-contact platform that combines an Arduino UNO R4-based temperature-sensing module with a Raspberry Pi-based thermal imaging system. A custom 3D-printed fixture was designed to maintain consistent positioning of the sensors and samples, thereby improving reproducibility. The platform enables synchronized tracking of temperature data and thermal images, supported by automated data processing and Python-based experimental control. To validate the system, an IR788 semi-interpenetrating network (sIPN) in a water-in-oil (W/O) emulsion was used as a model photothermal material. Upon 808 nm laser irradiation, the sensor-measured temperatures closely matched the localized thermal image data, confirming the reliability and cross-validation capability of the platform. These results demonstrate that the proposed system enables reproducible, non-contact, and integrated dual-mode thermal monitoring for advanced photothermal characterization.

PS1-175

Polymeric Nanoparticles as a Versatile Platform for Fluorescent Cell-Imaging and Electrochemical Sensing

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In our previous work, F127-based semi-interpenetrating network (sIPN) nanoparticles with tunable surface charge were developed by incorporating phosphate- and trimethylammonium-functionalized F127. Varying their ratio controlled the surface charge density, and positively charged nanoparticles showed significantly enhanced cellular uptake in HeLa cells, demonstrating the versatility of the sIPN platform. Building on this platformn, the sIPN was repurposed as a redox-active material for glucose sensing. Screen-printed carbon electrodes (SPEs) were electrochemically activated and modified with Fc sIPNs, after which a spin-coated polyacrylamide (PAAm) layer was introduced to improve nanoparticle retention and mediator stability, followed by glucose oxidase (GOx) immobilization. Cyclic voltammetry confirmed reversible ferrocene redox through each step, and chronoamperometry showed a concentration-dependent glucose response, demonstrating their use as both nanocarriers and electroactive mediator platforms for glucose biosensing. These findings demonstrate that F127-based sIPN nanoparticles can serve as both nanocarriers and electroactive materials, highlighting their potential as stable mediator platforms for glucose biosensing.

PS1-176

Optimization of the Fabrication Process for Low-Voltage Electrically Programmable and Erasable Organic Floating-Gate Memories

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Previously, we have developed a solution-processable top-gate OFET memory with organic semiconductor floating gates by utilizing vertical phase separation in solution-processed organic blend films of PMMA and TIPS-pentacene [1]. It was found that the use of a donor-acceptor (D-A) polymer semiconductor, DPP-DTT, enables electrically programmable and erasable memory operation under dark conditions in floating-gate OFET memories [2]. In this study we demonstrate that optimization of the fabrication conditions of floating-gate OFET memories based on a DPP-based high-mobility D-A polymer, PDPP4T, reduces the programming and erasing voltages to 20 V.

Hydrophobic treatment of the surface of cross-linked poly(4-vinyl phenol) (PVP) films with octadecyltrichlorosilane, followed by thermal annealing of the PDPP4T semiconductor layer, significantly improves the field-effect mobility of the OFET devices. In contrast, the highest field-effect mobility in the OFET memory devices is obtained without thermal annealing. Furthermore, reducing the thickness of the parylene gate insulator to ~180 nm lowers the programming voltage from 60 V to 20 V. The resulting floating-gate OFET memories exhibit stable electrical programming and erasing operation at low voltages of ±20 V.

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PS1-177

$PbCl_2$-Regulated Crystallization Kinetics for Homogeneous Halide Distribution in Inverted $CsPbI_2Br$ Perovskite Solar Cells

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All-inorganic $CsPbI_2Br$ is a promising wide-bandgap absorber for tandem photovoltaics owing to its excellent thermal stability and suitable bandgap (~1.92 eV).[1] However, inverted $CsPbI_2Br$ solar cells still suffer from large open-circuit voltage (V_{OC}) losses caused by non-radiative recombination and halide inhomogeneity.[2] Here, we demonstrate that 1 mol% $PbCl_2$ additive effectively regulates crystallization kinetics and suppresses halide redistribution in $CsPbI_2Br$ films.

In-situ X-ray diffraction revealed that $PbCl_2$ promotes earlier nucleation during the room-temperature resting stage while retarding crystal growth during thermal annealing, enabling a more controlled crystallization process. This behavior is attributed to Pb–Cl–solvent coordinated species, which induce localized supersaturation and increase nucleation-site density.[3] The enhanced halide homogeneity is expected to reduce local bandgap fluctuations and suppress trap-assisted recombination.[4] Time-of-flight secondary ion mass spectrometry confirmed that $PbCl_2$-treated films exhibit more uniform Br^-

and I^- distributions across the perovskite layer compared with control films. The improved halide homogeneity reduces energetic disorder, as supported by decreased surface potential variation in Kelvin probe force microscopy, and suppresses non-radiative recombination, as evidenced by prolonged carrier lifetimes. Consequently, the optimized device achieved a champion efficiency of 16.3% with a V_{OC} of 1.25 V, demonstrating an effective precursor-engineering strategy for high-V_{OC} inverted $CsPbI_2Br$ solar cells.

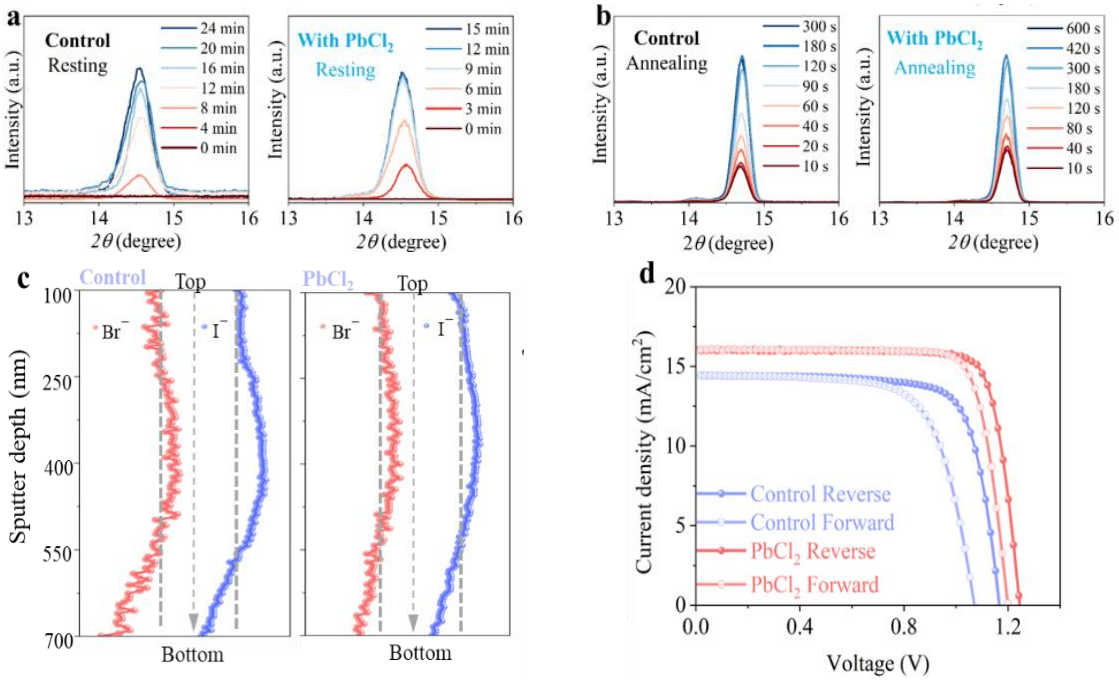

Fig. 1. Evolution of the perovskite (100) diffraction peak during the (a) resting and (b) annealing stages for control and 1% $PbCl_2$ films. (c) TOF-SIMS depth profiles of Br^- and I^- ions for control and 1% $PbCl_2$ films. (d) *J–V* characteristics of the champion control and $PbCl_2$ devices.

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PS1-178

Low-Energy Patternable Organic Semiconductor Utilizing Carbene-Driven 3-Dimensional Crosslinker

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Patterning of organic semiconductors (OSCs) is essential for realizing high-performance and highly integrated organic electronic devices, with direct patterning using crosslinkers emerging as a promising strategy. Although azide (-N_3) crosslinkers based on nitrene chemistry have been extensively investigated, they generally require harsh activation conditions, such as 254 nm UV irradiation or temperatures above 150 °C. In addition, their loading must be minimized to prevent deterioration of the electrical properties of OSCs, thereby limiting their practical applicability. Here, we present a low-energy patternable organic semiconductor network (LE-

OSN) based on carbene-driven crosslinkers containing tetrahedral diazo (=N_2) moieties. Carbene chemistry enables efficient network formation under mild processing conditions of 100 °C or 365 nm UV irradiation. The resulting crosslinked OSC films exhibit excellent solvent resistance and compatibility with conventional photolithographic processes, achieving high-fidelity pattern resolutions down to 2 μm. Moreover, the LE-OSN maintains its electrical performance even at high crosslinker loadings exceeding 10 wt%, demonstrating a broad processing window. We believe that this approach provides a versatile platform for advancing scalable OSC patterning technologies.

PS1-179

Freestanding PEDOT:PSS/Protic Ionic Liquid Nanomesh for Plant Health Monitoring

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Poly(3,4-ethylenedioxythiophene):polystyrenesulfonate (PEDOT:PSS) is widely used as a solution-processable conductive polymer for flexible bioelectronic interfaces because of its excellent electrical properties and processability.[1] However, constructing ultrathin conductive interfaces that simultaneously maintain electrical conductivity and mechanical robustness, remains a significant challenge. [2] In this work, we developed a freestanding conductive nanomesh consisting of an electrospun polyurethane (PU) nanomesh coated with a PEDOT:PSS/protic ionic liquid(*p*-IL) conductive layer. The PU nanomesh mechanically supports the ultrathin conducting film while preserving its open-network architecture, resulting in a lightweight and highly conformable conductive interface. By optimizing the nanomesh structure and coating conditions, continuous conductive pathways were established throughout the network, leading to reduced electrical impedance. The effects of nanomesh density and coating concentration on morphology, optical properties, and impedance were systematically investigated to optimize electrical performance while maintaining the structural characteristics of the nanomesh. The resulting conductive nanomesh readily adapted to complex plant surfaces and enabled stable impedance measurements for plant health monitoring. These results demonstrate a simple and effective strategy for developing freestanding conductive nanomesh platforms for next-generation plant bioelectronics.

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PS1-180

Iontronic Fringing-Field Proximity Sensors via Edge-Rich Stretchable Electrodes for High-Sensitivity Non-Contact Detection

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Fringing-field-based capacitive proximity sensors offer noncontact detection but are limited by low sensitivity and poor stretchability, restricting their use in wearable systems. Here, we report a hybrid electrode iontronic proximity sensor integrating an iontronic dielectric with mold-transfer-printed, edge-rich stretchable electrodes in a vertical architecture. Embedding ionic liquid ([EMIM][TFSI], IL) into a thermoplastic polyurethane matrix increases the effective permittivity 8.93–32.24 and lowers the elastic modulus, enabling ion-mediated polarization to amplify the fringing field response while preserving mechanical compliance. Systematic comparison of six top–bottom electrode combinations reveals that an asymmetric line–planar configuration concentrates fringing fields and maximizes capacitance change. Optimizing line width to 100 μm and IL loading to 40 wt% yields a peak capacitance change of 5.12 pF at a separation of 0.01 mm, representing over fivefold enhancement than conventional polymer dielectrics while maintaining stable electrode conductance under 50% strain and ≥1000 cycles. Tensile deformation narrows the line electrodes and thins the dielectric, further amplifying sensitivity (≈99% increase at 50% strain). On-finger demonstrations enable simultaneous detection of joint-bending posture and proximity, with material-selective response of metallic, biological, and dielectric targets. These results establish a general design strategy combining iontronic dielectrics with edge-dominated stretchable electrode for next-generation wearable proximity and gesture-sensing platforms.

PS1-183

Chlorine Substitution Enables Structural Robustness against Doping-Induced Disorder in Isoindigo-based Thermoelectric Polymers

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Chemical doping is widely employed to boost the electrical conductivity of conjugated polymers. However, the incorporation of bulky dopants often disrupts the structural and morphological disruption of the conjugated polymers, offsetting the electrical benefits and thermoelectric performance. Herein, a chlorinated isoindigo-based polymer (IID-Cl) is rationally designed to simultaneously improve morphological stability and dopant accommodation during doping process. Despite its slightly larger backbone torsion than the non-chlorinated polymer (IID-H), IID-Cl high-degree of crystalline property and well-developed fibrillar microstructure. Notably, the increased backbone distortion in IID-Cl facilitates continuous dopant accommodation, while the enhanced intermolecular interactions are also preserved throughout the doping process. Consequently, IID-Cl effectively maintains interconnected charge-transport pathways throughout the doping process than those of doped IID-H, resulting in a high charge carrier mobility and concentration. In contrast, IID-H suffered from the severe structural collapse with amounts of aggregates on surface. As a result, IID-Cl achieved a maximum electrical conductivity of 119.43 S cm^{-1} upon $AuCl_3$ 8 mM. When implemented in organic thermoelectric devices, the doped IID-Cl delivered a maximum power factor of 93.2 μW m^{-1} K^{-2}. These results suggest that structural control via chlorine substitution is a highly effective molecular design strategy for developing high-performance OTE devices.

PS1-185

Organosilane-Mediated Dispersion of Barium Titanate in Elastomeric Emission Layers toward High-Performance Alternating-Current Electroluminescent Devices

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Flexible and stretchable alternating-current electroluminescent (ACEL) devices are promising candidate technologies for soft optoelectronics [1]. To enhance luminance, high-permittivity barium titanate (BTO) is commonly blended into the emission layer, but its hydrophilic surface has poor compatibility with the hydrophobic silicone matrix. This causing pristine BTO to aggregate and seed interfacial micro-voids. Consequently, in thin emission layers, pristine BTO loading is restricted to 20 wt% before stretchability and tensile strength fell sharply.
In this work, the BTO surface was modified with 3-(trimethoxysilyl)propyl methacrylate (TMSPM) via an acid-catalyzed sol-gel process to build a covalently bonded organosilane layer [2]. Surface analysis confirmed a uniform 5.32 nm thick organic coating under a 100 wt% TMSPM condition. This methacrylate-terminated layer improved the dispersion and interfacial adhesion of the modified BTO (m-BTO) within the silicone matrix, successfully raising the attainable filler loading to 25 wt% in thin emission layers. At identical filler contents, m-BTO composites maintained higher tensile stress and strain at break than pristine composites, while ensuring a stable dielectric constant. Flexible ACEL devices utilizing the 25 wt% m-BTO composite achieved a peak luminance of 515.5 cd/m^2, proving that high luminance and mechanical durability can be reconciled [3].

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PS1-186

Strain-Insensitive Piezoionic Hydrogel for Static and Dynamic Pressure Sensing

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Hydrogel pressure sensors are promising platforms for wearable electronics because their soft, tissue-like, and biocompatible properties enable conformal contact with the human body.[1,2] However, mechanical stretching can distort pressure-induced signals and limit accurate sensing during body motion. Achieving high pressure sensitivity with minimal tensile-strain interference therefore remains a long-standing challenge for hydrogel-based wearable sensors.[3] Here, we introduce a self-powered piezoionic pressure sensor based on a micropillar-patterned hydrogel composed of Sn-doped $BaTiO_3$

(Sn-BTO) nanorods, LiCl, and a cationic copolymer network. Under pressure, polarized Sn-BTO nanorods generate an internal electric field that drives Li^+ redistribution, while fixed cationic groups suppress Cl^- motion and support directional ion transport. The device detects both static and dynamic pressure without an external power source and maintains stable output under tensile strains up to 200%, with variations below 3.7% and 4.3%, respectively. It also achieves a low detection limit of 1.5 Pa and reliable performance over 1000 cycles. On-body tests, including radial pulse monitoring during joint motion, demonstrate its potential for stable wearable pressure sensing.

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PS1-187

Studies of Antimony Precursors Containing Alkoxy Carboxamide and Alkoxy Thiocarboxamide

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Thin films containing antimony, such as antimony oxide, nitrides, sulfides, and chalcogenides, are receiving significant attention due to their diverse applications, including photoelectrochemical water splitting catalysts, lithium-ion battery anode materials, photosensitizers for solar cells, and UV filters for interferometers. In particular, the excellent electrical properties, outstanding transparency, high refractive index (2.0–2.5), wide bandgap (>3.4 eV), and high breakdown voltage (~5.7 GV m−1) of antimony trioxide (Sb_2O_3) make it suitable for a wide range of applications, such as gas sensors, dielectric mirror systems for the ultraviolet region, electronic devices, and thin-film transistors (TFTs).

Furthermore, antimony exhibits a much higher extreme ultraviolet (EUV) absorption rate than light organic elements, it is a suitable material for EUV photoresists for enhancing sensitivity and reducing stochastic effects.

In this study, a new series of antimony precursors was synthesized by alkoxy carboxamide and alkoxy thiocarboxamide structures. The synthesized Sb complexes were comprehensively characterized using FT-IR, ^1H and ^{13}C NMR, EA, TGA, and single-crystal X-ray diffraction (SC-XRD). In addition, an antimony oxide film was formed by spin coating a Sb compound solution followed by heat treatment, and this was confirmed by XPS.

PS1-188

Memory Characteristics of Organic Floating-Gate Transistors Using Naphthalenediimide-Based Donor–Acceptor Polymers

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In our previous studies, poly(3-hexylthiophene)-based p-channel OFET memories with a solution-processed organic floating-gate layer were found to exhibit a large threshold voltage (V_{th}) shift only under light illumination by storing photogenerated electrons in TIPS-pentacene floating gates [1]. In contrast, the use of a diketopyrrolopyrrole-based donor–acceptor polymer (DPP-DTT) enables V_{th} shifts under dark conditions through electron injection from Au source–drain electrodes into the DPP-DTT [2]. Here, we investigate the light-induced memory characteristics of n-channel OFET memories using naphthalenediimide (NDI)-based donor–acceptor polymers.

We observed that both OFET memories using P(NDI2OD-T2) and P(NDI2OD-T) exhibit negative V_{th} shifts by applying a negative gate voltage under red LED light, indicating the storage of photogenerated holes in the floating-gate layer. To clarify the role of photocarrier generation in the organic floating gates, memory devices with vacuum-deposited metal-nanoparticle floating gates were fabricated. The results suggest that TIPS-pentacene floating gates suppress hole injection from the NDI layers and the storage of photogenerated holes induced by the detrapping of photogenerated electrons from the floating gates contributes to the negative V_{th} shifts under red light.

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PS1-189

Electroluminescence and Photovoltaic Characteristics of Inverted TTA-UC OLEDs Using Alkyl-Substituted Fullerene Derivatives

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In recent years, organic light-emitting diodes (OLEDs) based on triplet–triplet annihilation upconversion (TTA-UC) have attracted increasing attention owing to their low operating voltage, which is beneficial for wearable devices and prolonged device lifetime. More recently, multifunctional organic devices integrating electroluminescence (EL) and photovoltaic operation have been widely explored by exploiting the dual functionality of organic semiconductor heterojunctions. In this study, we investigate the characteristics of inverted OLEDs incorporating rubrene as the vacuum-deposited donor layer and soluble fullerene derivatives with different alkyl substituents as the solution-processed acceptor layer.

The EL characteristics of OLEDs strongly depend on the annealing temperature of the C60MC12 layers. Crystallized C60MC12 layers annealed at 150 °C significantly suppress the radiative recombination of charge-transfer states, likely because the ordered alkyl chains act as spacers at the donor–acceptor interface, thereby enabling efficient TTA-UC emission. In addition, TTA-UC OLEDs incorporating annealed C60MC12 layers exhibit improved current density–voltage characteristics and higher power conversion efficiency. These results indicate that optimization of the donor–acceptor interface enables simultaneous enhancement of EL and photovoltaic performance in a single device.

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PS1-191

Light-Tunable Memory Characteristics of Floating-Gate Organic Transistor Memories for Neuromorphic Applications

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Recently, neuromorphic devices inspired by biological neural systems have attracted significant attention as low-power and highly efficient information-processing technologies [1]. Previously, we reported that top-gate OFET memories with a solution-processed organic floating-gate layer composed of PMMA and TIPS-pentacene exhibit light-induced synaptic characteristics. Furthermore, we demonstrated that conductance modulation in floating-gate OFET memories using dinaphtho[2,3-b:2',3'-f]thieno[3,2-b]thiophene (DNTT) under blue LED illumination (465 nm) is applicable to analog synaptic devices for pattern-recognition applications [2]. In this study, we investigate light-tunable memory dynamics under red LED illumination (660 nm) for pre-processing functions in neuromorphic vision sensors.

Under blue illumination, the memory response is nearly independent of light intensity, whereas under red illumination it exhibits a pronounced intensity dependence. Retention measurements under red illumination reveal that the drain current decays rapidly under low-intensity conditions, whereas a high-conductance state is maintained under high-intensity conditions. These results indicate that the programming process is governed by wavelength-dependent carrier generation, whereas light intensity determines the resulting retention characteristics. The observed behavior resembles synaptic plasticity in biological synapses, suggesting applications in image pre-processing, including contrast enhancement and noise reduction.

This work was supported by the Kansai Research Foundation for Technology Promotion and JSPS KAKENHI (JP20K21007, JP21H04564, JP24K00931, and JP24K01330).

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PS1-192

Chiral Bifacial π-Conjugated Ladder Polymers with Chirality-Induced Spin Selectivity

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Chiral bifacial π-conjugated molecules, in which two distinct molecular faces are programmed within a single chiral π-skeleton, provide a unique platform for controlling interfacial functions, chiroptical properties, and spin-dependent phenomena such as Chirality-Induced Spin Selectivity (CISS). We have previously developed chiral bifacial molecules and demonstrated their CISS properties and applications to organic solar cells.[1–3] Here, we introduce bifacial ladder polymers: rigid double-stranded backbones bearing two deliberately differentiated molecular faces. A C_2-chiral 2,8-dibromoindenofluorene monomer with syn stereochemistry across two sp^3 carbons was designed to enable chirality-assisted, regioselective ladderization. Polymerization with a diboronate comonomer

under Suzuki–Miyaura conditions afforded precursor polymers, which were converted into well-defined bifacial ladder polymers with preserved facial differentiation. The homochiral polymers exhibited emergent solid-state chiroptical behavior, forming one-handed supramolecular helices with circular dichroism intensities over 100-fold stronger than those of monomeric or non-ladder analogues. They also showed robust CISS, with spin-polarization values exceeding ±90% and opposite signs for the two enantiomers. These results establish bifacial ladder polymers as a versatile platform for emergent self-assemblies and spin-selective functions in organic polymeric materials.[4]

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PS1-193

Solution-Processed Top-Gate Organic Transistors Using Slot-Die Coating for Nonvolatile Memory Applications

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The use of a top-gate/bottom-contact (TG/BC) configuration enables solution processing of short-channel, high-performance OFETs on prefabricated microscale source-drain electrodes. Furthermore, solution-processable floating-gate TG/BC OFET memories have been developed by exploiting vertical phase separation between a small-molecule semiconductor and a polymer insulator [1,2]. In recent years, meniscus-guided coating has attracted significant interest as a technique for fabricating organic semiconductor thin films [3]. In this study, we employ slot-die coating to fabricate TG/BC OFETs based on polymer semiconductors toward the development of high-performance floating-gate OFET memories.

We used the high-mobility polythiophene of poly(3,3'''-dialkylquaterthiophene) (PQT-12), and organic semiconductor layers were deposited in an N_2-filled glove box to prevent p-type doping by oxygen and moisture. We found that the morphology of PQT-12 films strongly depends on the wettability of the coating solution. The use of a mixed solvent of tetrahydrofuran:o-xylene (8:2) significantly reduces the surface roughness of the PQT-12 films, improving the semiconductor/dielectric interface in the TG/BC OFETs. The resulting devices exhibit a high linear field-effect mobility of 0.12 $cm^2V^{-1}s^{-1}$, demonstrating that slot-die-coated OFETs can achieve performance comparable to spin-coated devices.

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PS1-194

Relationship between Vertical Mobility and Mobility Anisotropy in Organic Semiconductor Films Determined by a Vertical-Lateral Mobility Measurement Method

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In crystalline organic semiconductor films, high lateral mobility exceeding 10 cm^2/Vs has been achieved; however, vertical mobility, which is crucial for organic light-emitting diodes and organic solar cells, remains significantly lower, typically ranging from 10^{-4} to 10^{-3} cm^2/Vs. To overcome these limitations, it is essential to reduce anisotropy and enhance the three-dimensional nature of charge transport. In this study, we investigated carrier-mobility anisotropy in crystalline organic semiconductor films using a unique simultaneous measurement method that combines FET measurements for lateral mobility and the MIS-CELIV method [1] (charge extraction by linearly increasing voltage with an MIS structure) for vertical mobility. The relationship between vertical mobility and anisotropy was investigated in MT-pyrene [2] films prepared under various conditions, and a correlation between lower anisotropy and higher vertical mobility was observed.

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PS1-196

Spatial separation of redox centers enables high capacity utilization in carbazole-based organic electrode materials

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Organic electrode materials (OEMs) are promising alternatives to transition-metal oxide electrodes for rechargeable batteries owing to their elemental abundance and structural tunability. Among them, p-type OEMs based on carbazole (Cbz) redox centers have attracted particular interest due to their high redox potentials and ability to undergo electropolymerization, which suppresses active material dissolution. To maximize theoretical capacity, previous molecular designs have densely incorporated multiple Cbz centers into a compact molecular framework while minimizing redox-inactive components. However, the resulting close proximity of the redox centers causes strong electrostatic

repulsion between the oxidized centers and steric congestion upon uptake of bulky anions. These effects hinder access to higher oxidation states, thereby elevating the potentials of successive redox reactions beyond the electrochemical window of conventional electrolytes. Herein, we report a novel Cbz-based OEM, named TPC, in which three Cbz redox centers are spatially separated to minimize intercenter interactions and provide sufficient free volume for anion insertion. This molecular design enables reversible occurrence of multi-electron redox reactions within the electrochemical window, leading to higher capacity utilization of TPC (~67%), compared to the control compound TCB (~33%) in which three Cbz units are closely connected through a single phenyl ring.

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PS1-197

Coordination-Driven Crosslinking of Conductive and Structural Polymers for Self-Healing Ionic Thermoelectrics

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Conductive polymers are highly attractive for thermoelectric applications due to their excellent processability and flexibility. Incorporating self-healing mechanisms into these materials is crucial for enhancing sustainability by maintaining performance over time and extending device longevity. Such capabilities are especially vital for wearable electronics, which are prone to frequent mechanical damage that leads to efficiency decrease. This study develops a robust self-healing thermoelectric material designed to overcome these challenges. A complex composite was synthesized by integrating functional components into a conductive and ionic polymer matrix using a specific crosslinking agent.[1] This strategic addition facilitated more efficient charge carrier transport, leading to a significant enhancement in electrical conductivity. The intrinsic ionic and hydrated nature of the resulting composite facilitated rapid and effective self-healing. Characterization of the electrical and ionic thermoelectric performance demonstrated a synergistic combination of high conductivity and durable self-healing properties. These results highlight the potential of these complex materials as a foundation for high-performance, long-lasting wearable applications.

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PS1-199

Fabrication of Flexible Thermoelectric Generators via Controlled Doping Processes of Large-Area Carbon Nanotube Sheets

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Thermoelectric generators, which convert temperature gradients into electrical energy, are highly effective for harvesting waste heat from various environments.[1] Recently, significant attention has been focused on developing flexible thermoelectric generators (f-TEGs) applicable to wearable devices, utilizing flexible and biocompatible materials such as polymers and carbon nanotubes (CNTs). Among these, CNTs have attracted great interest due to their excellent electrical conductivity and mechanical properties.[2] However, their practical application has been constrained by poor solution dispersibility.[3] In this study, we successfully demonstrate the operation of a high-performance f-TEG utilizing large-area CNT sheets fabricated from oxidation-treated CNTs with improved aqueous dispersibility.[4] Specifically, the f-TEG was fabricated by cutting the prepared CNT sheets and applying a drop-casting doping process. In this process, the CNTs substituted conventional metal electrodes,[5] thereby significantly improving cost efficiency. Furthermore, a hot-pressing process was introduced to enhance the electrical properties by inducing densification of the CNT sheets and mitigating defects originating from oxygen-containing functional groups. Subsequently, stable f-TEG operation was achieved through thermal activation and encapsulation under inert conditions. This study provides a facile, industrially scalable, and cost-effective fabrication methodology for f-TEGs compared to conventional processes.

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PS1-200

Interfacial Ion-Transport Networks for High-Force Artificial Muscles

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Ionic polymer actuators have attracted considerable interest for artificial muscles, wearable haptic devices, and soft robotics. However, conventional Nafion-based actuators are fundamentally limited by the trade-off between ionic conductivity and mechanical stiffness, making it challenging to simultaneously achieve efficient ion transport and high force generation.

Here, we report a PEG-functionalized silica hybrid electrolyte that establishes an interfacial ion-transport network while reinforcing the Nafion matrix. The engineered interface promotes efficient ion transport without sacrificing mechanical integrity, thereby mitigating the conductivity–stiffness trade-off. As a result, the hybrid electrolyte enables robust electromechanical actuation with improved force-generation capability. Structural and spectroscopic analyses reveal that the enhanced performance originates from PEG-mediated interfacial ion transport while preserving Nafion's intrinsic ionic-domain morphology. This work presents an effective interfacial electrolyte engineering strategy for next-generation artificial muscles and wearable soft robotic systems.

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PS1-201

One-Shot Carbon-Insertion Annulation Toward Polycyclic Carbocations with Near-Infrared Optical, Electronic, and Photocatalytic Properties

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Cationic π-conjugated molecules have attracted considerable attention as functional organic materials because of their unique electronic structures and potential applications in optoelectronics and photocatalysis.[1] However, access to structurally diverse polycyclic carbocations remains limited because existing synthetic methods are often restricted to specific molecular frameworks. We recently reported the first one-shot carbon-insertion annulation, which converts diarylaminobenzenes into fused polycyclic carbocations using the Vilsmeier reagent as a single-carbon source.[2] This transformation proceeds through a cascade of electrophilic aromatic substitutions and enables rapid construction of conventionally inaccessible carbocations. The method afforded helicene-type carbocations and polycyclic aromatic hydrocarbon (PAH)-derived cations. The resulting carbocations exhibited red-to-near-infrared (NIR) absorption and photoluminescence, with absorption extending to 850 nm in the most π-extended systems. In addition, the perylene-containing derivative formed charge-segregated stacking structure in the crystal and showed significant charge-transfer couplings. Furthermore, the carbazole-containing carbocation functioned as a metal-free photocatalyst under NIR irradiation. In this presentation, we will discuss the carbon-insertion annulation, as well as the molecular structures, optical properties, crystal packing, and NIR photocatalytic applications of the synthesized carbocations.

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PS1-202

Development of Ladder-Type Oligomers via Multiple Boron Bridging toward Organic Semiconductor Laser Materials

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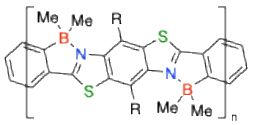

B-oligomer (n = 1, 2, 3)

Organic semiconductor laser diodes have attracted significant attention as next-generation technologies beyond organic light emitting diodes (OLED).[1,2] To achieve stable operation under electrical excitation, the thresholds for light amplification and intrinsic stability of organic gain media must be significantly improved. Therefore, we focused on ladder-type π-conjugated compounds, which feature rigid molecular frameworks and efficiently extended π-conjugation as promising candidates for suppressing structural disorder and enhancing oscillator strength, while simultaneously improving chemical robustness. In this study, we successfully synthesized a series of ladder-type oligomers by multiple boron bridging.[3] The quantum yields were enhanced by boron bridging and π-extension, and non-radiative decay was effectively suppressed in the ladder-type structures. Moreover, **B-dimer** showed a low ASE threshold of approximately 8.4 μJ cm^{-2}. Additionally, the excited-state dynamics were thoroughly investigated by transient absorption spectroscopy, and stimulated emission was observed.

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PS1-203

Pixel-Aligned Visible–Near-Infrared Imaging Using a Transparent Organic Photodiode Integrated on CMOS

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We demonstrate a vertically stacked visible–near-infrared image sensor by directly integrating a visibly transparent NIR organic photodiode onto a silicon CMOS image sensor. In this architecture, the upper organic photodiode selectively absorbs NIR light while transmitting visible wavelengths to the underlying silicon photodiode. This enables pixel-aligned VIS and NIR image acquisition without increasing the pixel footprint or sacrificing fill factor and spatial resolution. The transparent NIR photodiode employs a ternary photoactive layer composed of the newly designed donor polymer P(BDT-TQ), the non-fullerene acceptor IEICO-4F, and PMMA. The planar polymer backbone promotes strong NIR absorption, improved molecular ordering, and reduced energetic disorder, while PMMA suppresses trap-assisted processes and enhances visible transparency. The optimized device exhibits high average visible transmittance, low dark current, NIR detectivity above 10^{12} Jones, and stable dynamic response. The photodiode is deposited through a low-temperature solution process compatible with CMOS circuitry. The integrated imager provides clear spectral separation between the VIS and NIR channels and enables improved material discrimination compared with visible-only imaging. This approach offers a practical route toward compact, high-resolution multispectral image sensors.

PS1-204

Stretchable High-k Oxide dielectric using azide functionalized ligand

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Solution-processed, stretchable oxide thin-film transistors (TFTs) are critical for next-generation wearable and Internet of Things (IoT) devices, yet achieving high performance on soft substrates remains a significant challenge. Here, we demonstrate a fully solution-processed, stretchable all-oxide TFT fabricated directly on a polyimide substrate. The active layers employ an organic-inorganic hybrid strategy, where metal oxide nanoparticles are functionalized with synthesized bidentate ligands featuring azide termini and ethylene-glycol bridges. Using this ligand, we fabricated a high-k zirconium dioxide (ZrO_2) gate dielectric and an indium oxide (In_2O_3)/zinc oxide (ZnO) heterojunction semiconductor. The resulting TFTs, fabricated on a thin PI substrate, exhibit a compelling set of performance metrics. This fully solution-based methodology for integrating high-performance oxide semiconductors offers a promising pathway for flexible electronic systems.

PS1-205

Rational Molecular Design of π-Extended Thiazolothiazole for High-Performance UV-OPDs Seamlessly Integrated with CMOS

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Vacuum-deposited organic photodiodes (OPDs) offer unique advantages—including narrowband selectivity and compatibility with standard fabrication processes—but achieving ultraviolet (UV) selectivity in such devices remains a key challenge. This is due to the need to reconcile two competing design requirements: (1) strong π–π stacking for efficient charge transport, and (2) limited π-conjugation to retain a wide bandgap suitable for UV absorption and vacuum deposition. Here, we report a molecular design strategy for UV-selective OPDs based on thiazolothiazole (Tz)-based small molecules with tailored backbone planarity and conjugation length. The resulting vacuum-deposited active layers simultaneously exhibit wide bandgaps and robust π–π interactions. The optimized devices achieve outstanding UV selectivity (full-width at half-maximum: 60 nm), high specific detectivity (1.06×10^{12} Jones), and fast dynamic response (cutoff frequency of 50,100 Hz)—representing the highest performance for vacuum-deposited UV-OPDs reported to date. Furthermore, we demonstrate the seamless integration of these semi-transparent OPDs with CMOS image sensors, underscoring their potential for multifunctional imaging applications. Our findings provide key molecular insights for advancing UV-selective organic photodetectors.

PS1-206

Enhancing Organic Photodiodes Performance in the SWIR Region by Tuning Open/Closed-shell Characteristics

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Organic photodiodes (OPDs) operating in the short-wave infrared (SWIR) region are attractive for sensing and imaging in biomedical diagnostics, non-destructive inspection, and autonomous driving because of their tunable spectral response, low cost, and compatibility with biocompatible, eye-safe illumination. However, practical SWIR OPDs still suffer from insufficient long-wavelength absorption and inefficient exciton dissociation. Here, we report thiadiazolo quinoxaline (TQ)-based push-pull copolymer donors (P1, P2, and P3) containing different ratios of open- and closed-shell blocks. These polymers exhibit strong SWIR absorption, with absorption onsets of 1700, 1450, and 1680 nm, corresponding to ultralow optical band gaps of 0.73, 0.85, and 0.74 eV, respectively. The polymers were blended with the non-fullerene acceptor COTIC-4F to fabricate inverted bulk heterojunction OPDs. Optical and electrochemical analyses confirmed narrow band gaps and large exciton binding energies. Device results show that increased open-shell character enhances long-wavelength external quantum efficiency but also increases dark current density, whereas increased closed-shell character suppresses dark current and promotes exciton dissociation while reducing long-wavelength response. These results reveal a fundamental trade-off and suggest a molecular design strategy for organic SWIR photodetectors with balanced absorption, charge generation, and noise suppression, thereby advancing high-performance solution-processable photodetection platforms for next-generation optoelectronic applications in the SWIR region.

PS1-207

Ligand-Engineered Stretchable Metal Oxide Transistors Using Styrene-Functionalized β-Diketone Ligands

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Solution-processed metal oxide thin-film transistors (TFTs) are promising for next-generation display backplanes because of their high electrical performance, low-voltage operation, and scalable fabrication. However, conventional oxide dielectrics and semiconductors are intrinsically brittle, limiting their use in stretchable electronics. Here, we propose a ligand-engineering strategy to improve the mechanical compliance of the entire oxide transistor stack. A styrene-functionalized β-diketone ligand is introduced as a multifunctional additive for ZrO_2/In_2O_3/ZnO TFTs. The β-diketone group coordinates with metal oxide species, while the styrene group forms a thermally crosslinked organic network during annealing. Incorporating the ligand into the ZrO_2 dielectric and In_2O_3/ZnO semiconductor layers is expected to connect brittle oxide networks with a flexible molecular framework while preserving electrical performance. As an initial demonstration, TFTs containing 5 mol% ligand exhibited an on/off ratio of 7.33×10^4 and a field-effect mobility of 26 $cm^2/V \cdot s$, comparable to pristine devices. Stretchable TFTs will be fabricated on elastomeric substrates using a bottom-gate/top-contact architecture. CNT spray coating will form the gate electrode because CNT networks tolerate 200–250 °C annealing, while AgNW source/drain electrodes will be deposited afterward to avoid thermal degradation. This approach combines ligand-engineered oxide layers with compliant spray-coated electrodes for future high-performance intrinsically stretchable oxide TFT backplanes.

PS1-208

Electrostatic Ion Trapping in Organic Electrochemical Transistors for Record Neuromorphic Memory Performance

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Organic electrochemical transistors (OECTs) have emerged as promising candidates for neuromorphic computing owing to their mixed ionic-electronic conduction.[1] However, their memory performance remains limited by insufficient ion retention within the semiconductor channel.[2] Here, we present an electrostatic ion-trapping strategy based on a zwitterionic photochemical crosslinker (Z-FPA) that introduces permanent electrostatic trapping sites while preserving the intrinsic crystalline order of the polymer semiconductor. The fixed sulfonate groups regulate ion injection, whereas the quaternary ammonium groups strongly immobilize injected anions, producing enhanced hysteresis and stable memory characteristics. As a result, the optimized OECTs exhibit a record hysteresis strength of 96.4 V and a memory window of 8.65 V, while maintaining an on/off current ratio of approximately 10^6. Spectroscopic, structural, and thermodynamic analyses reveal that electrostatic ion trapping creates a 2.03 eV energy barrier, effectively suppressing ion back-diffusion and stabilizing the doped state. The strategy is further demonstrated to be applicable to multiple polymer semiconductors, highlighting its generality. Neuromorphic simulations based on the experimental device characteristics achieve 92.87%

recognition accuracy on the MNIST dataset, demonstrating the potential of electrostatic ion trapping for high-performance neuromorphic electronics.

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PS1-209

Visible-Light Photoprogrammable Transistors Enabled by an All-Organic Triplet-Sensitized Diarylethene Channel Layer

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Light-programmable transistors are promising for next-generation electronics, but their reliance on high-energy UV light undermines stability and safety. Here, we demonstrate visible-light-only photoprogramming of organic field-effect transistors (OFETs) by integrating an all-organic triplet-sensitized diarylethene system into the channel layer. Rather than redesigning the photoswitch, this modular additive strategy renders a conventional UV-responsive diarylethene visible-addressable in solid-state transistors. A ternary blend of a polymer semiconductor (DPP-DTT), a diarylethene photoswitch (DAE-HP), and an organic triplet sensitizer (4CzIPN) enables fully reversible current modulation via photocyclization at 450 nm and photocycloreversion at 520 nm. The devices achieve a switching ratio up to 2.8×10^3 and remain stable over 100 cycles. Mechanistic studies show that DAE-HP and 4CzIPN co-localize within amorphous domains without perturbing polymer crystallinity, maintaining charge-transport continuity while ensuring the short-range proximity required for triplet exchange. Transient absorption spectroscopy supports efficient triplet–triplet energy transfer (TTET) from 4CzIPN to DAE-HP as the driver of visible-light photoswitching. These results identify nanoscale organization as the key lever for UV-free operation and provide a practical blueprint for safer, durable, and solution-processable light-programmable organic electronics.

PS1-210

Persistent SWIR Photonic Memory for Low-Light Neuromorphic Sensing

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Photonic synaptic devices integrate optical sensing, processing, and memory within a single platform, but broadband response, limited retention, and complex architectures hinder practical implementation. Here, we present a visible-transparent two-terminal photonic memory device that selectively operates around 1100 nm. Its spectral selectivity suppresses visible-light interference and supports filter-free optical sensing in the NIR/SWIR region. The device progressively accumulates weak optical inputs and stably retains the stored state under bias, enabling temporal integration of low-intensity signals. After

bias removal, the memory gradually relaxes, providing a hardware-level transition between persistent long-term memory and temporary self-relaxing memory. This adaptive retention behavior may reduce unnecessary data storage while preserving important optical information during active operation. By combining wavelength selectivity, visible transparency, persistent memory, and structural simplicity, the device provides a promising platform for in-sensor computing, low-light imaging, biomedical sensing, optical communication, and neuromorphic vision.

PS1-211

Development of PbS Quantum Dot-Based SWIR Avalanche Photodiodes Using a Photocrosslinkable Ligand for LiDAR Applications

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Short-wave infrared (SWIR, 1550 nm) LiDAR has attracted increasing attention because of its superior eye safety, extended detection range, and robust operation under adverse environmental conditions. However, the widespread adoption of SWIR imaging systems is still constrained by the high manufacturing cost of conventional InGaAs photodetectors. Although PbS quantum dot (QD)-based avalanche photodiodes (APDs) have emerged as a promising low-cost alternative, their high-field operation is often limited by insufficient surface stability and electrically insulating ligand environments.[1]
Here, we present an organic–inorganic hybrid SWIR APD employing an azide-functional dithiolane ligand (FPA-S) as a photocrosslinkable surface ligand. The FPA-S ligand effectively passivates the exposed {100} facets of large-sized PbS QDs while simultaneously forming a conductive crosslinked network with surrounding organic semiconductors through UV-induced photocrosslinking. This conductive encapsulation suppresses phase separation, improves film robustness, and promotes efficient carrier transport between neighboring QDs. Consequently, the device exhibits stable avalanche operation above −30 V with an avalanche gain of approximately 90. Furthermore, activation energy analysis reveals a bias-dependent sign inversion, indicating that the carrier multiplication originates from impact ionization rather than trap-assisted processes. This strategy provides a practical route toward high-performance, CMOS-compatible, and low-cost SWIR avalanche photodetectors for next-generation LiDAR systems.

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PS1-212

Semi-IPN Networked Organic Electrochemical Transistors for Multifunctional In-Memory pH Sensing

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Normal healthy skin is mildly acidic, with a typical pH range of 4–6, whereas chronic non-healing wounds often become alkaline. This change in pH is closely related to infection and wound condition, making pH a useful biomarker for monitoring wound status. However, conventional pH sensors generally do not have built-in memory and therefore require separate data storage units or continuous

communication circuits. These additional components increase power consumption and device size, making the system less suitable for long-term wearable monitoring.
In this work, we present an in-memory pH sensor based on an organic electrochemical transistor (OECT) that integrates sensing and memory functions into a single device. PEDOT:PSS is used as the transistor channel, while polyaniline serves as the pH-sensitive electrode. A functional precursor is introduced into PEDOT:PSS and polyaniline to form a semi-interpenetrating polymer network (semi-IPN), which improves ion transport. The resulting electrochemical modulation of the PEDOT:PSS channel allows pH-dependent signals to be detected and retained without an additional memory component. The material design may also help reduce power consumption, simplify the device structure, and improve sustainability. This approach could be applied to wearable wound-monitoring systems for continuous sensing, data storage, and self-diagnosis.

PS1-213

Deterministic Chaos-Driven Gyroscopic Thermal Evaporation for Biomimetic 3D Curvilinear Optoelectronics

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This study introduces Gyroscopic Thermal Evaporation (GTE) as a transformative 3D nanomanufacturing platform that overcomes geometric shadowing and thin-film anisotropies inherent in conventional vacuum processes on curvilinear substrates. By integrating a three-axis gimbal system with asymmetric counterweights, we generate non-diagonal components in the inertia tensor to induce deterministic chaos. This ensures a mathematically ergodic trajectory that achieves ultra-uniform coatings (relative standard deviation < 5%) on high-curvature targets. GTE maintains the standard fixed-source configuration, allowing cost-effective utilization of existing industrial infrastructure. Utilizing this platform, we fabricated biomimetic hemispherical organic photodetectors mimicking biological eye architectures. GTE enables seamless, dead-zone-free deposition on both concave (human/aquatic-inspired for aberration mitigation) and convex (insect-inspired for wide-field vision) structures. The resulting devices exhibit a 180° field of view, a low dark current of 10^{-9} A/cm^2, and over 70% mitigation of cosine losses. Coupled with spherical organic solar cells, this work establishes GTE as a pivotal manufacturing route for next-generation omnidirectional energy-harvesting and biomimetic adaptive vision systems.

PS1-214

Vacuum-Evaporated Organic Photodiodes with Enhanced Bandwidth for Multi-Channel Optical Communications

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Next-generation visible light communication (VLC) networks demand ultra-fast, reliable, and scalable receiving elements to accommodate exponentially growing data traffic. Organic photodetectors (OPDs) offer key benefits including tunable spectral absorption, low-temperature processing, and large-area fabrication. However, conventional OPD architectures are severely bottlenecked by narrow frequency

bandwidths, which stem from low intrinsic carrier mobility and high RC time constants induced by thick active layers and complex multi-layered hetero-interfaces.
To overcome these fundamental limits, we demonstrate a high-bandwidth OPD featuring a remarkably simplified, vacuum-evaporated architecture. By systematically streamlining the constituent layer composition and precisely scaling down film thicknesses, we directly minimize series resistance while optimizing geometric capacitance, thereby suppressing RC signal latency.
Consequently, the streamlined OPD achieves an expanded cut-off frequency exceeding 1 MHz alongside rapid charge transport dynamics. This robust temporal response enables high-fidelity signal conversion and seamlessly supports multichannel spatial multiplexing required for high-density 16×16 MIMO receiver arrays and 1 Gb/s transmission rates. Furthermore, the simplified vacuum-evaporation approach enhances process reproducibility and fabrication yield, providing a practical foundation for integrating high-performance organic optoelectronics into scalable, next-generation VLC infrastructures.

PS1-215

A Tetradentate Deep-Blue Pt(II) Complex with High Efficiency for Solution-Processed OLEDs

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Deep-blue organic light-emitting diodes (OLEDs) remain challenging because high-energy triplet excitons can induce non-radiative decay and reduce device efficiency. Herein, a novel N-heterocyclic carbene (NHC)-based tetradentate Pt(II) complex, Pt-BuCzTrip, was designed and synthesized for solution-processed deep-blue OLED applications. A bulky 2,4,6-triisopropylphenyl substituent was introduced into the benzimidazole-based ligand framework to enhance steric hindrance around the Pt(II) complex. Pt-BuCzTrip exhibited deep-blue photoluminescence at 450 nm with a narrow full width at half maximum of 24 nm in dichloromethane solution. The Pt-BuCzTrip-doped film showed a high photoluminescence quantum yield of 85% and a decay lifetime of 1.04 μs. The complex also exhibited good thermal stability with a decomposition temperature of 358 °C. The optimized solution-processed PHOLED containing 3 wt% Pt-BuCzTrip showed an electroluminescence maximum of 456 nm, CIE coordinates of (0.141, 0.132), and an EQEmax of 18.1%. Furthermore, a PSF-OLED employing Pt-BuCzTrip as the phosphor-sensitizer and v-DABNA as the terminal emitter achieved an EQEmax of 28.6%.

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PS1-216

Molecular Aggregation Control in Vacuum-Depositable NFAs Enables High-Performance NIR OPDs through Trap Suppression and Enhanced Charge Dynamics

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Solution-processed organic photodetectors (OPDs) have attracted considerable attention as low-cost platforms for large-area optoelectronic applications. However, limitations in process scalability and device-to-device reproducibility continue to impede their practical deployment. Vacuum-deposited OPDs offer an attractive alternative by enabling precise control over film thickness, high spatial uniformity, and direct compatibility with established OLED manufacturing infrastructure. Despite these advantages, most vacuum-deposited OPDs still rely on fullerene-based acceptors, whose restricted spectral tunability, high cost, and limited thermal robustness constrain further performance optimization and technological integration. In this work, we introduce a series of vacuum-depositable donor–acceptor non-fullerene acceptors (NFAs) with systematically strengthened terminal electron-withdrawing characteristics. These structural modifications produce only minor variations in the frontier molecular orbital energies, while substantially altering intermolecular interactions and solid-state packing. Increased acceptor strength promotes more pronounced J-aggregative behavior in thermally evaporated films, resulting in enhanced molecular organization and reduced energetic disorder. The resulting aggregation characteristics suppress trap-assisted recombination and lower the noise current, while simultaneously improving charge transport and carrier extraction. Consequently, the NFA-based OPDs exhibit markedly enhanced responsivity, specific detectivity, and thermal stability relative to conventional fullerene-based devices. In particular, the optimized NFA device outperforms its C60-based counterpart, underscoring the effectiveness of aggregation control as a molecular design strategy. These findings demonstrate that device performance in vacuum-deposited OPDs is governed not only by frontier energy-level alignment but also critically by intermolecular aggregation and solid-state organization. This work therefore establishes aggregation engineering as a key design principle for developing fullerene-free, high-performance vacuum-deposited OPDs.

PS1-217

Synthesis of a Sterically Hindered Cyclometalated Platinum(II) Complex with Reduced Aggregation for High-Efficiency solution-processed Blue OLEDs

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A sterically hindered cyclometalated platinum(II) complex, **PtON-iPrTB**, was designed and synthesized as a blue phosphorescent dopant for solution-processed organic light-emitting diodes (OLEDs). The complex incorporates a multidentate N-heterocyclic ligand and bulky *tert*-butyl-substituted aryl groups that provide steric shielding around the platinum center, effectively suppressing

intermolecular aggregation and excimer formation. The electroluminescent performance of PtON-iPrTB was evaluated in both phosphorescent (Ph) and phosphor-sensitized fluorescence (PSF) OLEDs. As a phosphorescent emitter, PtON-iPrTB delivered a maximum external quantum efficiency (EQE) of **18.3%**, with a current efficiency (CE) of **24.7 cd A^{-1}** and a power efficiency (PE) of **15.5 lm W^{-1}**. When employed as a triplet sensitizer in PSF-OLEDs, the device exhibited an improved EQE of **28.7%** while maintaining stable blue emission with CIE coordinates of **(0.134, 0.147)**. These results demonstrate that steric engineering is an effective strategy for developing highly efficient solution-processed blue OLED materials with reduced aggregation.

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PS1-218

Dynamic Hydroxo-Complexation in Mixed Ionic–Electronic Conductors for High-Performance Wearable Organic Thermoelectric Devices

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In organic mixed ionic–electronic conductors (MIECs), thermovoltage arises from the coupling between electronic transport and ionic Soret diffusion, with the identity of the mobile ionic species influencing both the electrochemical potential gradient and ion-transport pathways. Herein, dynamic hydroxo complexation is exploited as a design strategy to construct tetravalent cation-doped protonic conductor (TPC) films. In the PEDOT matrix, hydroxo complexes serve as high-density proton-supplying Lewis acidic sites, enabling temperature-gradient-driven protonic Soret diffusion and efficient proton conduction. Following optimization of the relative humidity (RH) and microstructural aggregation behavior, the TPC thin films exhibited an exceptional ionic Seebeck coefficient of 47.4 mV K^{-1} at room temperature and 90% RH. To realize a device architecture suitable for wearable applications, a solution-processed thermoelectric device was fabricated, in which the electrolyte layer was deposited on a hydrogel substrate and enclosed by a second hydrogel layer serving as a chamber for harvesting ambient moisture. Owing to flexibility and ability to harvest ambient moisture, the device maintained stable operation at 30–40% RH and was integrated into a wearable thermoelectric ring module.

PS1-219

Design and Characterization of Easily Synthesizable Electron Acceptors for Polymer Solar Cells

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Polymer solar cells have attracted considerable attention as next-generation photovoltaic devices owing to their lightweight, flexibility, and solution processability.[1,2] Advances in non-fullerene acceptors have substantially improved device performances. The Y6-based fused electron acceptors enabled power conversion efficiencies exceeding 19%.[3,4] However, most fused acceptors possess complex molecular structures and require multistep synthesis, resulting in high manufacturing costs and scalability issues. To address these challenges, non-fused electron acceptors have emerged as promising alternatives. In this study, we designed and synthesized the easily synthesizable acceptors via the simple

synthetic routes, incorporating intramolecular noncovalent interactions to enhance their conformational stabilities. The optical and electrochemical properties of the resulting acceptors were systematically characterized, and the photovoltaic performances of the devices based on new acceptors were evaluated.

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PS1-220

Three-Dimensional Integrated Laser Delivery System for Optical Interconnection in Trapped-Ion Quantum Computers

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Scaling trapped-ion quantum computers to large numbers of qubits requires delivering multiple laser wavelengths to individual ions with low loss, high stability, and fast control. We present a three-dimensionally integrated photonic platform for laser delivery and optical interconnection within and between quantum processing units (QPUs). Wide-band waveguide circuits covering 493–1762 nm address the optical transitions of Ba+ qubits on a monolithic chip, where splitters, waveguide crossings, and grating couplers route light toward individual trap sites. For interconnecting QPUs, N×N multi-branch optical switches based on cascaded Mach–Zehnder interferometers with multimode-interference couplers were developed, demonstrating reconfigurable routing for N = 3 [1]. Two-wavelength crossing waveguides that simultaneously guide 422 nm and 1092 nm light were also fabricated for ion addressing, guided by an integrated multi-wavelength routing architecture for scalable laser delivery[2]. Furthermore, ultrahigh-speed electro-optic modulators using ferroelectric PLZT thin films achieved V_pL < 1.0 V·cm, a propagation loss of 0.30 dB/mm, an electro-optic figure of merit above 1000 pm/V, and modulation beyond 100 Gbaud, including 116-Gbaud PAM4 operation. These photonic building blocks, combined with photonic wire bonding for chip-to-chip and fiber-to-chip coupling, form a scalable optical interconnection architecture toward optically connected cluster-type trapped-ion quantum computers[3,4].

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PS1-221

PEDOT:PSS-Based Protection Layer via Transfer Printing for Dendrite-Free Lithium Metal Electrodes

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Lithium metal batteries (LMBs) are considered the next-generation energy storage systems due to their high theoretical specific capacity and low electrochemical potential. However, the practical application

of LMBs is hindered by uncontrolled lithium dendrite growth and continuous side reactions with the electrolyte. These safety issues lead to poor coulombic efficiency, rapid capacity fade, and significant hazards, such as internal short circuits. In this study, we fabricate a highly uniform PEDOT:PSS-based protecting layer via transfer printing to stabilize the lithium metal electrodes. The protecting layer serves as physical barrier to suppress dendrite protrusion and functions as an ion-conductive framework. A simple transfer method through roll pressing and separation between current collector and lithium can form a homogeneous artificial interface on lithium surface. As a result, the protected lithium electrode exhibits significantly enhanced cycling stability and reduced voltage overpotential compared to bare lithium.

PS1-222

Multifunctional Separators Based on Organic Conductive Polymers for Interfacial Stabilization in Lithium Metal Batteries

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Lithium metal batteries (LMBs) are promising high-energy storage devices, but their practical application is hindered by uncontrollable lithium dendrite growth and interfacial instability. While recent surface modifications address this, conventional inorganic coatings often suffer from limited flexibility and detachment. Herein, we propose a functional separator coated with a multifunctional organic conductive copolymer, PEDOT:P(SS-*co*-AA), to effectively regulate the lithium anode interface. Designed through the organic integration of a conductive polymer and a hydrophilic binder, this coating dramatically improves the poor electrolyte affinity of commercial polyolefin separators, minimizing ion transfer resistance. Furthermore, strong intermolecular interactions impart robust mechanical stability, while the organic conductive network uniformly guides ion flux during lithium deposition. This synergistic effect physically and electrochemically suppresses dendrite growth. Electrochemical evaluations confirm the proposed separator prevents internal short circuits and maintains highly reversible lithium plating/stripping under harsh operating conditions. Ultimately, this study highlights organic copolymer with both conductivity and hydrophilicity as a promising platform for resolving interfacial challenges in LMBs.

PS1-223

Enhanced High-Rate Reversibility of Carbon-Lean Ni-Rich Cathodes through a Uniform Polymeric Conductive Network

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Conventional polymer binders provide mechanical cohesion but contribute little to electronic conduction, increasing the reliance of Ni-rich cathodes on conductive carbon.[1] Here, styrene sulfonic acid (SS) and acrylic acid (AA) were copolymerized to form P(SS_x-co-AA_y), and EDOT was subsequently polymerized in the presence of P(SS_x-co-AA_y) to produce PEDOT:P(SS_x-co-AA_y). The aqueous dispersion was converted into an NMP-compatible liquid binder through solvent exchange. By varying the SS:AA molar ratio among 2:1, 1:1, and 1:2, electrical conductivity and COOH-mediated adhesion

were systematically balanced. Unlike conventional PVDF, PEDOT:P($SS_{0.66}$-co-$AA_{0.33}$) contains abundant COOH groups that promote hydrogen-bonding interactions with the oxygen-containing NCM811 surface, while serving as an electronically conductive and PFAS-free binder.[2] Excess AA increased electrode brittleness, whereas PEDOT:P($SS_{0.66}$-co-$AA_{0.33}$) provided the most favorable balance of conductivity, adhesion, and elasticity. The optimized binder formed a continuous and uniform polymeric conductive network and exhibited markedly lower electrochemical impedance than the other binders. GITT further revealed a higher apparent Li^+ diffusion coefficient.[3] These advantages enabled enhanced reversible cycling under high-rate charge/discharge conditions of 3C/3C and 4C/4C. Furthermore, cathodes containing 97 wt% active material achieved stable long-term cycling, demonstrating the potential to increase electrode-level energy density while mitigating degradation associated with increased interparticle contact resistance.

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PS1-224

In-situ AI Analysis of Single-Molecule Bridging Dynamics in Electroless Gold Plating (ELGP) Nanogap Electrodes

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Single-molecule electronics offers a profound platform for next-generation nanoelectronics; however, realizing reliable devices is severely hindered by low bridging yields and the stochastic nature of molecule-electrode interfaces. Building on our fabrication of robust heteroepitaxial spherical (HS)-Au/Pt nanogap electrodes via self-terminating electroless gold plating (ELGP)[1,2], we developed a scalable approach to observe intrinsic molecular dynamics. These electrodes provide an ideal platform for molecular adsorption with a gap size of 3-4 nm and excellent thermal stability. By immersing them in a solution of rigid π-conjugated molecules (Si2x2 derivatives)[3], we simultaneously fabricated multiple single-molecule junctions. To overcome the analytical limitations of conventional current measurements, we constructed an *in-situ* AC measurement system coupled with an advanced machine-learning framework. By combining multi-prototype clustering (MPC)[4] and Hidden Markov Models (HMM), our analysis systematically extracts low-probability transition states from complex current fluctuations. Future investigations into the solvent dependence of these bridging dynamics will fully demonstrate the exceptional efficacy of this approach as a powerful evaluation methodology. Ultimately, this *in-situ* AI framework provides a robust metric for uncovering the hidden dynamic behaviors of adsorbed molecules, establishing key principles for scalable single-molecule device architectures.

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PS2-050

Ion-Conductive and Electron-Modulating Artificial Interphase for Dendrite-Free Zinc Anodes

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Aqueous rechargeable zinc batteries (ARZBs) are promising energy-storage systems owing to their safety and low cost; however, their practical application remains challenged by the instability of Zn metal anodes. Nonuniform Zn^{2+} deposition together with parasitic interfacial reactions frequently results in dendrite formation, corrosion, and hydrogen evolution, leading to rapid performance degradation. Herein, we report a conductive polymer–ionic liquid composite interphase based on poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate)/3-methylimidazolium:tetracyanoborate (PEDOT:PSS/p-MIM:TCB) for stabilizing Zn metal interfaces. The introduction of the ionic liquid promotes controlled phase separation within the PEDOT:PSS matrix, creating interconnected Zn^{2+} transport pathways while preserving interfacial stability under aqueous conditions. Moreover, the work-function mismatch between the composite layer and Zn establishes an electron-regulating interphase that suppresses undesirable electron transfer and enables more uniform Zn^{2+} deposition. Consequently, the coated Zn electrodes deliver stable Zn plating/stripping behavior for 144 h at 10 mA cm^{-2} and 0.5 mAh cm^{-2}. When coupled with α-MnO_2 cathodes, the modified Zn anodes also provide superior rate performance, exhibiting an increase of approximately 100 mAh g^{-1} at 1000 mA g^{-1} compared with bare Zn. These results demonstrate that the simultaneous regulation of ionic transport and interfacial electron transfer offers an effective route toward highly stable Zn metal anodes for aqueous battery systems.

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PS2-052

Visualizing the Charge Carrier Dynamics in Donor-Acceptor Heterostructure Organic Semiconductor Films via fs-Transient Absorption Microscopy

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Donor-acceptor heterostructure organic solar cells (OSCs) are promising candidates for next-generation photovoltaic applications due to their broad spectral coverage, efficient charge generation, and tunable morphology.[1] Non-fullerene acceptor (NFA)-based OSCs have recently achieved power conversion efficiencies (PCEs) of nearly 20% through small-molecule engineering, making them approaching the efficiency of commercial silicon-based solar cells.[2, 3]
Despite intensive studies on charge carrier dynamics in heterostructure OSC, the relationship between the active layer morphology and charge carrier dynamics remains poorly understood. To investigate the effect of acceptor molecule modifications on carrier dynamics, we prepared three different types of Y-series small molecules (Y6, YCF3, and YCF3-BO) paired with the donor polymer PM6.
Using fs-transient absorption microscopy (fs-TAM), we directly visualized charge carrier diffusion with high spatial and temporal resolution. By selectively tuning the pump and probe wavelengths, we independently tracked the diffusion of photoexcited charge carriers in the donor and acceptor domains.[4] This wavelength-selective imaging strategy enabled the real-spacetracking of charge transfer from PM6 to the Y-series small molecules. Furthermore, by monitoring the mean-squared displacement (MSD) of the photoexcited species as a function of time, we observed distinctly different diffusion behaviors among the three acceptor systems. These results provide fundamental insights into how molecular modifications influence charge carrier dynamics and spatial diffusion in the active layers of high-performance OSCs.

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PS2-054

Optical Response and Photoluminescence Enhancement in Ag Nanocube-Based Plasmonic Nanostructures

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Metal nanostructures exhibitng localized surface plasmon resonance (LSPR) can enhance emission from organic luminescent materials through local-field enhancement and nanogap plasmon modes. In this study, Ag nanocube (AgNC)-based nanogap and multilayer structures were investigated to clarify their optical response and emission enhancement.

AgNCs were synthesized by a solvothermal method and combined with Ag thin films and organic/oxide spacer layers. In the Ag/Alq_3/AgNC nanogap structure, where an Alq_3 emitting layer was placed between AgNCs and a bottom Ag film, photoluminescence (PL) intensity was enhanced by approximately 14 times compared with an Alq_3 single film. This enhancement is attributed to nanogap plasmon formation between AgNCs and the Ag mirror.

To further analyze the optical response of AgNC/metal-film coupled structures, AgNC/WO_3/Ag multilayers were fabricated using WO_3 as a transparent spacer. Optical density spectra calculated from transmittance showed that AgNC/WO_3 exhibited a broad increase above 400 nm, suggesting red-shifted and broadened AgNC-derived LSPR due to the WO_3 environment. AgNC/WO_3/Ag further increased the optical density in the 400–600 nm region. These results indicate that AgNC–spacer–Ag coupling modifies optical modes and contributes to PL enhancement.

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PS2-055

Fabrication of Mg Nanostructures by Nanosphere Lithography and Evaluation of Their Optical Properties

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Localized surface plasmon resonance (LSPR) in metallic nanostructures has attracted considerable attention for improving the efficiency of organic light-emitting devices. In previous studies, photoluminescence enhancement was observed in Al nanostructures, where native oxide layers were suggested to act as spacers between the metal and emitter.[1] In this study, Mg nanostructures, which form thicker native oxide layers than Al, were investigated to clarify the influence of oxide layers on plasmonic properties. Mg nanostructures were fabricated on quartz substrates by nanosphere lithography using polystyrene beads with diameters of 350, 500, and 750 nm. The morphology was characterized by AFM, and optical absorption spectra were measured before and after deposition of a 100-nm-thick Alq_3 layer. The absorption spectra of the fabricated Mg nanostructures showed a redshift of the absorption band with increasing nanostructure size, suggesting LSPR excitation. After deposition of the Alq_3 layer, a redshift and a clearer LSPR-related absorption band were observed. Notably, similar peak clarification has also been reported for Al nanostructures, in which native oxide layers are expected to form. These results suggest that the interfacial structure, including native oxide layers, may play an important role in the optical response of these nanostructures.

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PS2-056

Enhancing Ductility of Poly(butylene succinate) Copolyesters through BHET Incorporation

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Poly(butylene succinate) (PBS) is a sustainable polyester with good processability, but balancing strength and ductility remains challenging [1,2]. In this study, PBS-based copolyesters were synthesized by phosphoric acid-catalyzed melt polycondensation using bis(2-hydroxyethyl) terephthalate (BHET), a key intermediate obtainable from chemical recycling of polyethylene terephthalate (PET) [3]. Mg(2-ethylhexanoate)2 was introduced at the final polymerization stage to induce phosphate-metal ionic interactions and tailor the chain architecture [4].
Structural analyses confirmed successful incorporation of BHET-derived units into the PBS backbone. 31P NMR showed that BHET increased the phosphate triester fraction from 17% for BHET-free PBS to 48%, 60%, and 70% for copolymers containing 5, 10, and 15 mol% BHET, respectively, suggesting enhanced phosphate-induced long-chain branching. Residual monoester and diester species are expected to contribute to ionic aggregation through Mg2+ coordination.
Mechanical properties were strongly dependent on BHET content. BHET-free PBS showed a yield strength of 34 MPa, modulus of 370 MPa, and elongation at break of 180 +/- 130%. Incorporation of 5 mol% BHET afforded the most balanced properties, with a yield strength of 26 MPa, modulus of 290

MPa, and improved elongation at break of 370 +/- 30%. Higher BHET contents further increased ductility but reduced strength.

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PS2-057

Structural Dependence of Photoluminescence Enhancement in Ag Nanocavity Structures with an Ultrathin MgO Spacer

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Localized surface plasmon resonance (LSPR) in metal nanoparticles can enhance the local electromagnetic field and improve the emission efficiency of organic luminescent materials. In our previous study, photoluminescence (PL) enhancement was achieved using Ag/MgO/Ag nanocavity structures fabricated by thermal annealing, in which the top Ag layer was transformed into nanoparticles while maintaining the flatness of the bottom Ag mirror. However, the effects of structural parameters, such as the bottom Ag mirror thickness and MgO spacer thickness, on the enhancement characteristics has not been fully clarified.

Ag/MgO/Ag multilayers were deposited on glass substrates and thermally annealed at 200 °C for 1 min to form Ag nanoparticles. The bottom Ag thicknesses were varied from 20 to 30 nm, while MgO spacer thicknesses of 5 and 10 nm were employed. After Alq_3 deposition, PL spectra were measured to evaluate the emission enhancement.

The enhancement depended on both the bottom Ag mirror and MgO spacer thicknesses. Within the examined range, stronger PL enhancement was obtained with a 30 nm bottom Ag mirror and a 5 nm MgO spacer. These results indicate that the nanocavity geometry can sensitively affect emission enhancement, motivating systematic investigation of mirror and spacer thicknesses to clarify the mechanism.

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PS2-058

Spectroscopic Investigation of Interfacial Electron Extraction and Recombination at Azaacene-Based ETLs in Perovskite Solar Cells

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Despite rapid progress in halide perovskite solar cells, distinguishing interfacial charge-transfer processes from bulk transport and recombination dynamics remains challenging, limiting a quantitative understanding of transport-layer performance. In particular, the inherent limitations of C_{60}-based electron transport layers (ETLs), including limited structural tunability, parasitic absorption in the

visible region, and interfacial recombination losses, motivate a mechanistic investigation of alternative nonfullerene *n*-type materials. Here, we investigate interfacial electron transfer and recombination dynamics at the mixed-halide perovskite ($FA_{0.8}Cs_{0.2}Pb(I_{0.8}Br_{0.2})_3$, PVSK)/ETL interface using a nonfullerene *n*-type molecule, a tricyanosubstituted diquinoxalino-phenazine derivative (CN3). Complementary flash-photolysis time-resolved microwave conductivity (FP-TRMC) and time-resolved photoluminescence (TR-PL) measurements enable decoupling of interfacial electron extraction from bulk carrier transport, revealing that PVSK/CN3 exhibits rapid interfacial electron extraction ($\tau_{ex} \approx 10$ ns) with high quenching efficiency (93%), together with suppressed interfacial charge recombination characterized by an extended recombination time constant ($\tau_{CR} \approx 3.5$ μs) compared with the C_{60} counterpart ($\tau_{ex} \approx 39$ ns, $\tau_{CR} \approx 540$ ns). This work establishes a spectroscopic framework for separating interfacial charge transfer from bulk transport and provides practical design guidelines for high-performance nonfullerene ETLs.[1]

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PS2-059

Effects of Sulfur Doping and UV-Induced Structural Modification on the Organic Dye Decomposition Performance of Graphitic Carbon Nitride Photocatalysts

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In this study, graphitic carbon nitride was synthesized from melamine and thiocyanuric acid, and the effects of structural modification via sulfur doping and ultraviolet (UV) light irradiation on the photocatalytic performance were investigated. Sulfur doping enhanced the visible-light absorption efficiency and suppressed electron–hole recombination, thereby promoting the photocatalytic decomposition of Rhodamine B (RhB). Structural modification via UV irradiation induced the elimination of pyridinic nitrogen from the triazine rings and accelerated the RhB decomposition pathway via Rh110 (an intermediate formed by side-chain scission). Consequently, it was revealed that sulfur doping influences the overall reaction efficiency, whereas UV irradiation affects the selectivity of the reaction pathway.
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PS2-060

Organic–Inorganic Hybrid Binder Design for Water-Resistant Cold-Bonded Iron Ore Pellets

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Cold-bonded pelletization has attracted considerable attention as an energy-efficient agglomeration process for recycling iron ore fines because it eliminates the high-temperature induration required in conventional pellet production [1]. Nevertheless, the practical application of cold-bonded pellets is often limited due to their weak interfacial interaction. Mineral-based inorganic binders provide adequate mechanical support but exhibit poor water resistance owing to their hydrophilic nature [2], whereas conventional organic binders often undergo thermal decomposition during drying or curing [3]. In this study, an organic–inorganic hybrid binder composed of sodium silicate and a solvent-free curable epoxy resin was developed for the fabrication of cold-bonded iron ore pellets. The thermal stability of each binder was characterized by thermogravimetric analysis, and the effects of curing temperature and organic–inorganic binder ratio on the dry compressive strength and water resistance of the pellets were systematically investigated to determine the optimum binder formulation. Furthermore, the microstructural evolution of the pellets during thermal treatment was analyzed to elucidate the strengthening mechanism of the hybrid binder system. The proposed hybrid binder effectively integrates the rigid structural framework provided by sodium silicate with the chemically crosslinked epoxy network, resulting in enhanced mechanical strength and superior water resistance.

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PS2-065

Anthraquinone-based Multifunctional Additive for Efficient Defect Passivation and Enhanced Electronic Coupling in High-Performance Perovskite Solar Cells

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Perovskite solar cells (PSCs) are promising next-generation photovoltaics due to their high power conversion efficiency and low fabrication cost. However, several critical challenges still hinder their practical application. Intrinsic defects, such as undercoordinated Pb^{2+} ions and halide vacancies from film crystallization, act as trap states that induce non-radiative recombination and shorten carrier lifetimes, limiting performance. Additionally, ion migration within the lattice under prolonged light and thermal stress accelerates structural degradation, causing irreversible performance loss and poor operational stability. Here, we report an anthraquinone-based multifunctional additive designed to simultaneously address defect passivation and interfacial instability. The anthraquinone core provides an extended π-conjugated framework with high dielectric response, enabling strong interactions with charged defect sites. Meanwhile, phosphonic acid groups passivate electronic defects and anchor to the ITO anode, forming robust interfacial bonding. This dual functionality enables multisite passivation at both the bulk and buried interface, suppressing ion migration and acting as a barrier against moisture ingress. As a result, the optimized devices exhibit enhanced charge transport, reduced energy loss, and improved power conversion efficiency. Comprehensive optoelectronic and device analyses further confirm that the anthraquinone-based additive effectively mitigates both defect-related losses and stability issues in PSCs through a single-step strategy.

PS2-066

Strong Interfacial Coupling of a Self-Assembled Monolayer Enables Stable and Efficient Lead-Free Near-Infrared Perovskite Light-Emitting Diodes

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Perovskite light-emitting diodes (PeLEDs) have demonstrated outstanding optical properties and external quantum efficiencies (EQEs) comparable to conventional display technologies. However, the intrinsic toxicity of lead-based perovskites remains a critical barrier to commercialization. Tin (Sn)-based perovskites have emerged as promising lead-free alternatives for near-infrared (NIR) applications owing to their environmentally benign nature and suitable bandgap. PEDOT:PSS is widely employed as a hole transport layer (HTL) in such systems due to its high conductivity and optical transparency. However, direct contact between the perovskite layer and the acidic, hygroscopic PEDOT:PSS accelerates oxidation of Sn^{2+} to Sn^{4+}, causing excessive hole density and severe charge imbalance in Sn-based PeLEDs. Interfacial engineering using a self-assembled monolayer (SAM) offers an effective strategy to simultaneously enhance interfacial stability and charge transport. In this study, we introduce a phosphonic acid-based SAM, 3-PATAT, featuring trivalent anchoring groups that strongly bind to PEDOT:PSS and a π-conjugated framework that promotes efficient electronic coupling with the perovskite layer. The P=O groups further facilitate controlled crystallization via coordination with Sn species, while hydrophobic carbazole moieties act as a protective barrier, suppressing moisture ingress and inhibiting Sn^{2+} oxidation. Consequently, this SAM interlayer significantly improves both oxidation stability and device efficiency in Sn-based NIR PeLEDs.

PS2-067

Coumarin: A multifunctional organic dye for stabilizing grain boundaries and defects in perovskite films for high-performance solar cells

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Perovskite solar cells (PSCs) have achieved remarkable progress over the past decade, with power conversion efficiencies exceeding 26%. However, their long-term operational stability remains inferior to that of silicon-based modules, primarily due to energy losses associated with trap-mediated carrier recombination under thermal, illumination, and electrical stress. In particular, antisite defects and halide vacancies generate undercoordinated Pb^{2+} ions, which act as non-radiative recombination centers and accelerate both efficiency loss and device degradation. Here, we introduce a sulfur-substituted coumarin dye as a multifunctional additive for perovskite absorber films. The thionolactone moiety in the coumarin structure strongly coordinates with undercoordinated Pb^{2+} ions via Lewis base interactions, while simultaneously forming hydrogen bonds with halide ions, thereby stabilizing the [PbI_6] octahedral framework. As a result, coumarin-treated films exhibit enhanced crystallinity, improved surface coverage, and enlarged grain size, leading to more efficient charge extraction and suppressed trap-assisted recombination. Consequently, PSCs incorporating the coumarin additive demonstrate improved power conversion efficiency, enhanced long-term stability, and reduced hysteresis. This work highlights the potential of chemically engineered organic dyes as a versatile strategy for defect passivation and stability enhancement in high-performance PSCs.

PS2-069

Reproducible Two-Step Synthesis of Poly(3-hexylthiophene) in a Flow Reactor

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Flow chemistry has emerged as a promising approach for the synthesis of conjugated polymers due to its potential advantages in process control, heat and mass transfer, and reaction reproducibility compared with conventional batch polymerization. Poly(3-hexylthiophene) (P3HT) is one of the most widely studied and representative conjugated polymers for organic electronic applications. Regioregular P3HT is typically synthesized via a two-step Grignard metathesis (GRIM) polymerization, involving (i) monomer activation of 2,5-dibromo-3-hexylthiophene using a Grignard reagent and (ii) Ni-catalyzed catalyst-transfer chain-growth polymerization. Although this synthetic route has been adapted to flow chemistry systems, systematic investigations on molecular weight control and run-to-run reproducibility under flow conditions remain scarce. In this study, two synthetic approaches were investigated: a fully telescoped two-step flow process, in which both monomer activation and polymerization were conducted sequentially in flow without intermediate isolation, and a semi-flow process, in which monomer activation was performed in batch followed by flow polymerization. Both processes were repeated multiple times under various reaction conditions to evaluate and compare process reproducibility. The resulting polymers were characterized by gel permeation chromatography (GPC) to determine molecular weight and molecular weight distribution, and variations between independent runs were analyzed.

PS2-070

Deep-Energy-Level Anthraquinone Monolayers: Tailoring the Interface for Efficient Deep-Blue Perovskite Electroluminescence

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Perovskite light-emitting diodes (PeLEDs) have emerged as a transformative technology for next-generation displays due to their exceptional color purity and cost-effective fabrication. However, blue PeLEDs remain a critical bottleneck, suffering from low luminous efficiency and rapid degradation compared to red and green counterparts, thereby limiting the realization of full-color displays. Efficient carrier injection at the hole-injection interface is essential to address these challenges for wide-bandgap blue emitters. Commonly used hole-injection layers (HILs), such as PEDOT:PSS and MeO-2PACz, exhibit insufficient energy level alignment with the deep valence band of blue-emitting perovskites, causing imbalanced charge injection. In this work, we propose an anthraquinone-based self-assembled monolayer (SAM) as an alternative HIL, leveraging its intrinsically deep energy levels arising from strong electron affinity. This SAM exhibits a significantly higher work function than conventional HILs, enabling improved energy level matching with wide-bandgap perovskites for pure/deep-blue emission. Consequently, the devices demonstrate substantially enhanced performance, including an approximately threefold increase in luminance and a tenfold improvement in external quantum efficiency (EQE), alongside a desirable shift toward pure-blue coordinates. A systematic analysis of the optoelectronic properties of SAM-based deep-blue PeLEDs will be discussed.

PS2-071

Large-Area All-PEDOT:PSS Organic Electrochemical Transistors Enabled by Bar-Coating-Assisted Sulfuric Acid Treatment

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In this research, we developed a bar-coating-assisted diluted sulfuric acid post-treatment to enable the direct fabrication of large-area, highly conductive PEDOT:PSS films on flexible plastic substrates. By uniformly depositing a controlled amount of diluted sulfuric acid using a bar-coater, highly crystalline PEDOT:PSS films were successfully formed on PET substrates 10 × 10 cm². The post-treated films exhibited a high electrical conductivity of ~2,000 S cm⁻¹ while maintaining excellent optical transparency and mechanical durability even under repeated bending. Furthermore, all PEDOT:PSS organic electrochemical transistors (all-PEDOT:PSS OECTs) were fabricated directly on plastic substrates using crystalline PEDOT:PSS as gate, source, drain electrodes, and channel layer. Despite employing a PEDOT:PSS gate electrode, the devices exhibited stable electrochemical transistor operation. Device characterization across a large-area substrate revealed a normalized transconductance of approximately 1.5 S cm⁻¹ as well as excellent device-to-device uniformity, demonstrating the suitability of the proposed process for scalable OECT fabrication on plastic substrates. These results demonstrate that bar-coating-assisted diluted sulfuric acid treatment is a practical manufacturing strategy for large-area, transparent, flexible, fully polymeric OECT devices.

PS2-073

Machine Learning-Guided Solvent Screening and Phase Engineering of Quasi-2D Perovskites in Sustainable Solvent Systems for High-Performance Solar Cells

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Green-solvent processing is essential for the environmentally benign and scalable manufacturing of perovskite solar cells; however, the limited solubility of perovskite precursors in such solvents, along with the complex interplay between solvent choice, phase distribution, and device performance, remains a major challenge. [1] The vast combinatorial space of green solvents, liquid additives, and compatible molecular systems makes exhaustive experimental screening impractical. Here, we employ a machine learning (ML)-guided framework to systematically quantify precursor solubility and ink stability across a large library of green solvents and functional additives, enabling predictive solvent selection and film-formation control. [2] Based on ML-assisted screening, quasi-2D Ruddlesden-Popper (RP) perovskite films are fabricated using exclusively environmentally benign solvent systems. The resulting films, prepared over a range of precursor concentrations, are analyzed using X-ray diffraction and optical spectroscopy to elucidate phase distribution and dimensionality. Furthermore, structural, optical, and processing descriptors are integrated to train ML models that establish correlations between solvent parameters, phase characteristics, and device performance, enabling accurate prediction of power conversion efficiency. [3,4,5] This data-driven approach provides a general strategy for identifying optimal green solvent systems and tailoring phase-engineered quasi-2D perovskites, ultimately enabling sustainable, high-performance, and scalable all-layer green perovskite solar cells.

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PS2-074

Flow Synthesis of Poly(benzimidazobenzophenanthroline) (BBL) for Molecular Weight Control and and Improved Reproducibility

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Poly(benzimidazobenzophenanthroline) (BBL) is a promising electron-transporting ladder-type conjugated polymer characterized by its rigid and planar backbone, which promotes strong π–π stacking, highly ordered molecular packing, and excellent charge transport. Despite its potential for organic electronic devices, BBL is typically synthesized in highly viscous polyphosphoric acid (PPA), where limited heat and mass transfer hinder precise reaction control. Consequently, significant batch-to-batch variations, inconsistent molecular weights, and poor reproducibility are often observed, limiting reliable device fabrication and large-scale production. Herein, we report the first successful continuous-flow synthesis of BBL using a customized flow reactor system. Enhanced heat and mass transfer and precise residence time control provided a more uniform reaction environment than conventional batch synthesis. By systematically varying monomer concentration, reaction temperature, and residence time, the viscosity-average molecular weight (M_V) was precisely tuned over a range of 2.75 to10.8 kDa. Repeated syntheses under identical conditions exhibited excellent reproducibility with minimal molecular weight variation (±0.15 kDa). These results establish flow synthesis as a scalable and reproducible strategy for producing high-quality BBL with tunable molecular weight.

PS2-076

Hybrid Flame Retardant System of Inorganic and Phosphorus-Based Additives in Polyurethane Foams for Electric Vehicle Battery Insulation Pads

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As the global electric vehicle (EV) market expands, ensuring battery pack efficiency and safety has become increasingly critical. Lithium-ion batteries are temperature-sensitive, and their performance declines considerably in cold environments.[1] Thermal insulation pads installed at the bottom of EV battery packs protect the cells from external low-temperature conditions, thereby maintaining operational efficiency during winter, while also requiring flame retardancy and durability under vehicle vibration. Polyurethane (PU) foam is widely used for its low thermal conductivity, light weight, and

impact absorption, but its inherent flammability requires an effective flame retardant system. With the growing demand for halogen-free solutions, inorganic and phosphorus-based flame retardants have attracted attention through complementary mechanisms: aluminum trihydroxide (ATH) provides endothermic cooling and dilution via water release,[2] whereas phosphorus-based flame retardants act through gas-phase radical scavenging and condensed-phase char formation.[3] In this study, ATH and a phosphorus-based flame retardant were incorporated into PU foam individually and in combination, and the resulting flame retardancy and foaming behavior were comparatively investigated. The interaction between the inorganic and phosphorus-based system was examined in terms of combustion behavior, thermal stability, and foam morphology, providing fundamental data for eco-friendly flame-retardant PU foams for EV battery insulation pads.

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PS2-077

Surface engineering of freeze-dried casein porous materials toward sustainable sensing material

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The effective utilization of waste milk has been considered because it has been increasing in recent years [1]. Casein, which accounts for approximately 80% of the protein in waste milk, has been used as a material for hard plastics [2]. However, its applications remain limited. In this study, we prepared porous casein materials using freeze-drying and investigated their potential for use as adsorbents for dyes and heavy metals.
The casein porous materials were obtained by adding $CaCl_2$ solution to the casein dispersion followed by freeze-drying. The morphology and the elemental analysis were conducted by SEM-EDX. The adsorption properties capacity was evaluated by immersing the samples in aqueous solutions of methylene blue, erythrosine, and Cu^{2+} ions at various concentrations. The desorption properties were evaluated by immersing the samples after Cu^{2+} ions adsorption in EDTA solution. Ca^{2+} ions acted as crosslinkers between negatively charged casein molecules and improved the water resistance. The SEM observation confirmed the presence of numerous pores on the surface and cross-section. In the dye adsorption test, these porous materials absorbed physically both dyes. The adsorption isotherm analysis suggested monolayer adsorption. In contrast, Cu^{2+} ions adsorption was the multilayer adsorption. The Cu^{2+} ions desorption efficiency achieved 35–60%.

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[2] E. Lai *et al*., *Explor. Foods Foodomics*, **3**, 101099 (2025).

PS2-078

Electronic Properties and Carrier Transport of Reduced Polyoxometalate-Ferrocenium Salt

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Owing to their multiple redox states and proton-accepting oxygen networks,[1] polyoxometalates (POMs) have attracted significant attention as electron-proton hybrid conductors. However, their electronic properties in the mixed-valence state resulting from one-electron reduction remain an unexplored area. In this study, we combined reduced Keggin-type POMs with ferrocenium (Fc^+) cation to realize a novel mixed-valence POM salt, evaluating their potential as advanced electronic and spin-functional materials. Using the solution diffusion method, we synthesized solvate crystals of a one-electron reduced salt, $Fc_3H[PMo_{12}O_{40}]$ (**1**). Spectroscopic measurements confirmed the formation of a mixed-valence state driven by one-electron reduction. Single-crystal X-ray diffraction analysis revealed that anionic POMs and cationic Fc^+ are densely packed (**Fig. 1**), exhibiting high thermal stability up to 400 K. In AC impedance measurements, the Nyquist plot exhibited a clear electrode dependence between silver paste and carbon paste (**Fig. 2**), which suggests that the high-frequency components observed with silver paste reflects intrinsic proton transport within the crystalline bulk.

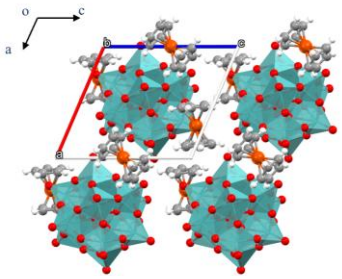

Fig. 1 Single-crystal structure

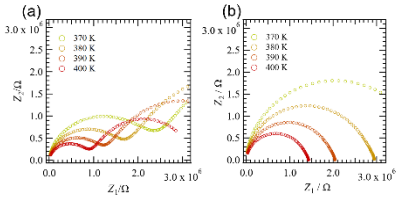

Fig. 2 Nyquist plot obtained from the AC impedance measurements

[1] T. Akutagawa *et al.*, *Inorg. Chem.*, **21**, 8628 (2006).

PS2-079

Electron Correlation Effects on Excited-State Stabilization in INVEST Emitters: A Computational Study

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Organic light-emitting diodes (OLEDs) require efficient utilization of singlet and triplet excitons to achieve high emission efficiency.[1] Molecules exhibiting inverted singlet–triplet energy levels (INVEST), in which the lowest singlet excited state lies below the lowest triplet excited state, have emerged as promising candidates because they enable energetically favorable triplet-to-singlet conversion via reverse intersystem crossing (RISC).[2] However, the electron correlation mechanism underlying the stabilization of the lowest singlet excited state and the resulting singlet–triplet inversion remains poorly understood.[3] In this study, the excited-state electronic structures of representative INVEST emitters were investigated using high-level electronic structure calculations. Particular emphasis was placed on the role of double excitation configurations in the correlation-driven

stabilization of the singlet excited state. The energy differences between single- and double-excitation configurations were analyzed to quantify their contributions to singlet-state stabilization. The results revealed that multiple double excitation configurations contribute to singlet-state stabilization, although a limited number of dominant orbital combinations account for most of the correlation-driven stabilization. These findings provide mechanistic insight into electron-correlation-driven singlet–triplet inversion and suggest that identifying the dominant electronic configurations responsible for singlet-state stabilization offers a rational design strategy for high-performance INVEST emitters.

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PS2-080

Variation of FWHM and Emission Energy with the Structure of DABNA-1 Analogues: A Computational Study

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Thermally Activated Delayed Fluorescence (TADF) Organic Light-Emitting Diodes (OLEDs) can achieve Internal Quantum Efficiencies comparable to phosphorescent OLEDs, sustaining strong research interest. Unlike conventional Donor–Acceptor type emitters, Multi-Resonance TADF (MR-TADF) emitters offer a narrow Full Width at Half Maximum (FWHM) and a small Stokes shift. Among these, DABNA-1 is a representative blue MR-TADF emitter with a particularly narrow FWHM[1]; in this work, starting from DABNA-1 as a parent skeleton, we aim to red-shift its emission toward the green region while preserving the narrow FWHM. Increasing molecular rigidity is generally thought to narrow the FWHM by reducing the reorganization energy[2]; however, the structural parameters that actually govern the FWHM remain largely unidentified. To address this, we systematically modify the DABNA-1 skeleton and trace how each structural change is reflected in the reorganization energy and FWHM. As a starting point, we examine Ring-Removal of the core skeleton, and to achieve a red shift, we further employ Ring-Fused and Ring-Extended strategies, analyzing the resulting changes in each case. The vibronic emission spectra were computed using the Duschinsky rotation method with the recursive Franck–Condon formalism.[3,4]

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PS2-082

Polar molecular arrangement and physical properties of thin film C_8-BTBT derivatives with fluoroalkyl chain

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We have investigated C8-BTBT amide derivatives exhibiting switching properties that originate from the dynamics of the alkylamide group. Among them, we have reported that a C8-BTBT derivative bearing a terminal fluoroalkyl chain (**1**; Fig. 1(a)) forms a non-centrosymmetric polar crystal structure, and that the polar alignment is maintained even in its thin films (Fig. 1(b)).[1]
In this study, aiming to control the carrier injection barrier by utilizing this polar thin-film structure, we first performed a detailed evaluation of the molecular alignment and investigated its physical properties of 1 in thin films prepared by both vacuum deposition and blade-coating. Out-of-plane XRD measurements and AFM images of the thin films suggested that molecule **1** adopts a self-assembled polar packing structure similar to that of the single crystal, in which the fluoroalkyl chains align in the same direction. Furthermore, we fabricated an organic field-effect transistor (OFET) device using a blade-coated thin film of **1**, which exhibited clear p-type semiconductor properties (Fig. 1(c)) with a hole mobility of 1.0×10^{-4} cm^2 V^{-1} s^{-1}. In this presentation, the effects of the fluoroalkyl chain on the thin-film structure and physical properties will be discussed.

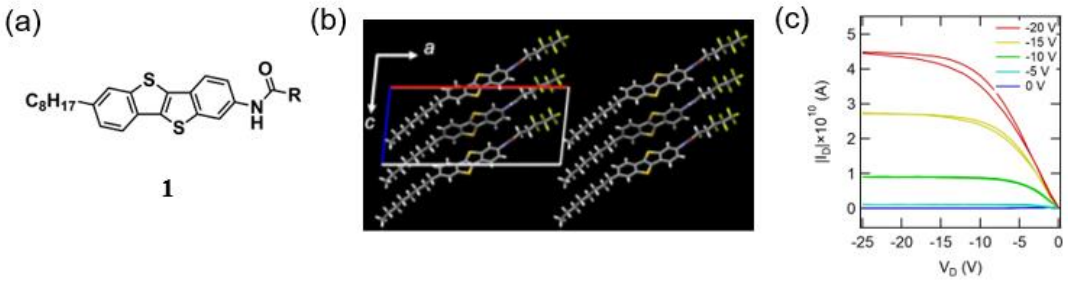

Fig. 1(a) Chemical structure of **1** ($R = C_5H_4F_7$), (b) crystal structure of **1** viewed along *b*-axis, (c) output characteristics of OFET device based on **1**.

[1] S. Kashii *et al.*, Structure and physical properties of organic polar thin films of C8-BTBT derivatives with fluoroalkyl group, The 19th JSMS meeting, 3C10.

PS2-083

Quinoxaline-Based Organic Interlayer for Buried Interface Engineering in Wide-Bandgap Perovskite Solar Cells

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Achieving high efficiency and operational stability in wide-bandgap perovskite solar cells (PSCs) is crucial for the realization of tandem photovoltaics that can exceed the efficiency limits of single-junction devices. However, severe nonradiative recombination losses at interfacial regions continue to hinder the performance of wide-bandgap PSCs. Here, we present a quinoxaline-based donor–acceptor organic interlayer engineered for the buried interface between NiOx and wide-bandgap perovskite in a p–i–n architecture. The introduction of the interlayer effectively passivates interfacial defects, suppresses nonradiative recombination, and promotes efficient charge extraction. In addition, the interlayer facilitates the formation of high-quality perovskite films, further improving device performance. Owing to its large molecular dipole moment, QxNN enhances the built-in potential, thereby enabling more effective carrier separation and transport. As a result, PSCs incorporating the organic interlayer exhibit

a significant improvement in power conversion efficiency, increasing from 17.5% to 20.0%. Furthermore, the modified devices demonstrate enhanced operational stability, retaining their photovoltaic performance after 500 h of storage under ambient conditions. These findings highlight the effectiveness of molecularly engineered organic interlayers for mitigating interfacial losses in high-performance wide-bandgap PSCs.

PS2-084

Tunable Synaptic Plasticity in Vertical Organic Electrochemical Diodes via Dopant-Ion Size Modulation

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Organic mixed ionic-electronic conductors (OMIECs) are key materials in organic electrochemical transistors (OECTs) and neuromorphic devices due to their dual ion-electron transport capabilities. While OECTs have been widely studied for emulating synaptic behavior, organic electrochemical diodes (OECDs) offer a promising alternative architecture for neuromorphic computing. In this study, we present the impact of a vertical OECD structure on synaptic plasticity. By applying tailored input signals and stimulation protocols, we demonstrate fundamental neuromorphic functions. Both liquid and solid-state electrolytes were evaluated, revealing that ionic size significantly influences long-term potentiation/depression cycles and retention behavior. Moreover, the solid-state electrolyte enhanced long-term operational stability and improved the linearity of synaptic weight updates. This highlights the tunability of synaptic responses through ionic control. These vertical OECDs exhibit promising synaptic properties and provide a scalable path forward for polymer-based neuromorphic computing platforms.

PS2-085

Molecular Engineering of Non-Fullerene Acceptors for SWIR Organic Photodetectors

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Near-infrared (NIR) and short-wave infrared (SWIR) organic photodetectors (OPDs) are essential components for next-generation biometric sensing and imaging technologies. To overcome the spectral limitations of conventional fullerene acceptors, the development of tailored non-fullerene acceptors (NFAs) with ultra-narrow bandgaps is highly demanded. Herein, we report the rational design and synthesis of a novel NFA. By incorporating a highly electron-deficient core flanked by cyclopentadithiophene (CPDT) bridges and chlorinated end-groups, the acceptor achieves a significantly red-shifted film absorption onset of 1272 nm and a narrow optical bandgap of 0.97 eV. Furthermore, the deep LUMO energy level (-4.14 eV) ensures a favorable energetic driving force for charge separation when blended with the PTB7-Th donor polymer. Through active layer thickness optimization via solution concentration control, the SWIR OPDs demonstrated a remarkable external quantum efficiency (EQE) of up to 21.0% at 1100 nm. Notably, the optimized thick-film device (~182

nm) effectively suppressed the dark current density (J_D) down to 4.34 x 10^{-6} A/cm^2 at -0.1 V, yielding a high specific detectivity (D*) of 8.17 x 10^{10}Jones. This work highlights that the synergistic combination of rational molecular engineering and active layer thickness optimization is a robust strategy for realizing low-noise, high-detectivity SWIR organic optoelectronics.

PS2-086

A Study on the Electrochromic Characteristics of Polymer Viologen Devices According to Monomers

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Electrochromism is a phenomenon in which color changes reversibly due to electrochemical oxidation or reduction reactions. Based on their low power consumption characteristics, electrochromic devices can be applied in various fields, such as smart windows and electronic paper. In this study, to improve the low operational stability of viologen derivatives among various electrochromic materials, polymerization was carried out after introducing substituents, and the structure was confirmed using Fourier Transform Nuclear Magnetic Resonance (FT-NMR) and Fourier Transform Infrared Spectroscopy (FT-IR). Furthermore, electrochromic devices were fabricated using the synthesized materials, and their electrochromic properties were evaluated through Ultraviolet-Visible Spectroscopy (UV-vis) and Optical Density (OD) measurements. As a result, it was confirmed that color development efficiency increased as the concentration of the electrochromic material increased, and that color development efficiency further improved with increasing chain length. In particular, compared to ethyl viologen, the polymeric viologen exhibited multiple color changes showing two or more color changes and demonstrated excellent operational stability.

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PS2-087

Asymmetric Molecular Design of Organic Nonlinear Optical Crystals for Broadband Terahertz Wave Generation

Haneul Kim[1+], Ga-Eun Yoon[1], Yu-Jin Park[1], Chaeyoon Kim[2], Woojin Yoon[3], Hoseop Yun[3], Mojca Jazbinsek[4], Fabian Rotermund[2], and O-Pil Kwon[1*]
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Organic crystals with non-centrosymmetric molecular arrangements are important for terahertz (THz) wave generation and other THz photonic devices. The introduction of asymmetric molecular structures into cationic chromophores is an effective approach for controlling crystal packing and inducing non-centrosymmetric structures. Here, we developed novel organic crystals with large macroscopic second-order optical nonlinearity and excellent thermal stability by introducing various anions into the 2-(4-hydroxy-3-methylstyryl)-1-methylquinolinium (OMQ) cation. The OMQ cation contains an asymmetrically shaped electron-donating group (EDG). The asymmetric EDG induces steric hindrance, suppressing molecular phonon vibrations and achieving a low THz absorption coefficient in the 0.5–4 THz range. The crystal incorporating a methoxy-substituted anion generated an ultrabroadband THz spectrum up to 16 THz and a THz electric field 40 times stronger than the standard inorganic ZnTe crystal. This enhanced performance is associated with its high effective first hyperpolarizability of 121 $\times$ 10^{-30} esu. Additionally, the crystal incorporating a halogen-substituted anion exhibited excellent nonlinear optical properties, high crystal density, and thermal stability. This work demonstrates that combining asymmetric cations with functionalized anions is a promising strategy for designing efficient and stable organic nonlinear optical materials.

PS2-088

Anion Engineering in Fluorinated Benzothiazolium Crystals for Efficient Terahertz Wave Generation

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Crystal engineering through the modification of intermolecular interactions provides an effective strategy for optimizing the optical properties of organic nonlinear optical crystals in THz frequency range. In this work, a highly nonlinear fluorinated benzothiazolium-based cation was used to form non-centrosymmetric crystal structure with a large first hyperpolarizability. As-grown single crystals based on the fluorinated benzothiazolium cation exhibit a V-shaped molecular arrangement, which reduces THz self-absorption and enables smooth THz spectra. To further optimize the THz wave generation performance, counter anions were varied by controlling the van der Waals volume of their substituents. The resulting organic salt crystals maintain an isomorphic crystal structure. This structural isomorphism preserves the optimal in-plane polar axis and acentric molecular ordering required for efficient THz generation. Moreover, variations in intermolecular interactions lead to distinct absorption characteristics in the THz frequency range. These results demonstrate that anion engineering provides an effective strategy to modulate THz absorption behavior while maintaining crystal structures favorable for efficient THz wave generation.

PS2-089

Isomorphic Organic Nonlinear Optical Crystals with Different Counter Anions for Terahertz Generation

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To design organic crystals for terahertz (THz) wave generation, many factors in chemical structure should be considered, and the relationships between these factors cannot be perfectly predicted. To offer insights into the design of new organic nonlinear crystals, we introduce three organic crystal families. Three different cationic chromophores (2-(4-(4-(hydroxymethyl)-piperidin-1-yl)styryl)-3-methylbenzothiazol-3-ium (PMB), 7-chloro-2-(4-(4-(hydroxymethyl)piperidin-1-yl)styryl)-1-methylquinolinium (PB7ClQ), and 7-chloro-2-(4-hydroxy-3-methoxystyryl)-1-methyl-quinolinium (HM7ClQ)) are used with distinct anions. All crystals sharing the same cationic chromophores exhibit isomorphic crystal structures with nearly parallel molecular ordering, resulting in a large macroscopic optical nonlinearity. However, their physical and optical properties differ due to the substituents on anions. Crystal density and lowest phase-transition temperature increased with increasing molecular weight of anions, while solubility decreased. This consistent tendency is also related to intermolecular interactions. Note that strong intermolecular interactions of polar substituents are crucial for suppressing THz self-absorption. Compared to the non-polar substituent-based crystals, the polar substituent-based crystals exhibit reduced THz self-absorption in the low-THz frequency region (< 6 THz), which is attributed to the suppression of entire-molecular phonon vibration.

PS2-090

Synthesis of *Syn*- and *Anti*-Type Bifacial Truxene with Phosphonic Acid Group and Application to Lead Perovskite Solar Cells

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Lead perovskite solar cells (PSCs) have witnessed dramatic improvements in power conversion efficiency (PCE) over 27%, high stability, and commercialization-compatible large-area fabrication. For p-i-n-type PSCs, hole-collecting monolayers (HCMs) have attracted significant attention in recent years. Monolayers exhibit high light transmittance and low electric resistance, making them promising candidate materials for high-efficiency, high-stability PSCs. In particular, high PCEs have been reported in HCMs of MeO-2PACz[1], which has a carbazole skeleton and a phosphonic acid group as an anchor group, and 3PATAT-C3[2], which utilizes a triazatruxene skeleton. A general, major challenge in HCMs is a control over perovskite film coverage, as some of HCMs show hydrophobic property. In this study, we synthesized phosphonic acid-appended truxene (PATRX) HCM that has a *syn*-type bifacial

structure.[3] For composition, its structural isomer (*anti*-type) was also synthesized and investigated for their application as HCMs of PSCs. We present the synthesis and other properties of PATRX and the performance of PSCs.

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PS2-091

Efficient Near-Infrared Organic Photodetectors via Additive Engineering of TBzIC-Based Non-Fullerene Acceptors

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Near-infrared (NIR) organic photodetectors (OPDs) suffer from high dark currents and inefficient charge transport due to their narrow bandgaps. To overcome this, we modified the side alkyl chains of a proquinoid-structured TBzIC backbone[1] to enhance intermolecular packing. The modified-TBzIC NFAs showed an extended absorption up to 1260 nm, and their enhanced packing improved the crystalline structure, which is expected to facilitate charge transport and reduce trap density.
The incorporation of solvent additives during OPD device fabrication has been demonstrated as a convenient and efficient strategy to improve the bulk-heterojunction (BHJ) morphology. Here, we investigated the changes in crystalline structure and the improvement in photoelectric effects by incorporating three types of processing additives (CN, DPE, and DIO). In particular, grazing incidence wide-angle X-ray scattering (GIWAXS) analysis showed that the CN incorporated device exhibited enhanced crystallinity, which suppressed randomized molecular aggregation, precisely inducing a face-on orientation optimized for vertical charge transport. Consequently, this adoption of CN additive effectively suppressed dark currents while improving photocurrent extraction efficiency. The optimized OPD achieved a detectivity (D) exceeding 1012 Jones at 1260nm under a -0.5V bias, proving that the crystallinity enhancement strategy via additive engineering is key to improving device performance in NFA-based NIR OPDs.

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PS2-092

New Organic Nonlinear Optical Crystals with Orthogonal Cation-Anion Dipole Coupling for Broad Terahertz Generation

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In this work, we designed organic nonlinear optical salt crystals by introducing fluoro substituent into phenolic quinolinium cationic chromophores The fluorinated quinolinium derivative, also retains the crystal symmetry of widely reported phenolic quinolinium, while maintaining large macroscopic optical nonlinearity. Particularly, this crystals show an orthogonal cation–anion dipole coupling arrangement that suppresses the participation of the molecular anion in entire-molecular phonon vibrations in THz frequency range. Notably, this packing arrangement shows fewer distortions and spectral dimples at low THz frequency range by reducing THz self-absorption, enhancing the THz transparency in the 0.5~2.7 THz spectral range. This strategy could overcome the conventional nonlinearity–transparency tradeoff in organic NLO crystals. In addition, fluoro substituent acts as a halogen/hydrogen bond donor site. These secondary interactions decrease the crystal's void volume and increase the crystal density, enhancing the function of π–π stacking of the cations, which could also contribute to suppressing phonon vibrations.

PS2-094

Understanding Transient Ion Transport in Ionogel-Based Organic Electrochemical Synaptic Transistors

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Although electrochemical transistors have been widely explored for memory devices, there is still a lack of in-depth understanding of their mechanisms in the devices with ionogels. In this study, we present a set of complementary analytical approaches to capture the working mechanisms of the devices and elucidate the fundamental principles of their memory behaviors. Electrochemical impedance spectroscopy revealed that ion transport driven by diffusion is significantly slower than drift-driven ion transport within the electrolyte. We also found that the dense polymer matrix of the electrolyte can restrict the motion of ions under a constant gate current, effectively reducing the ion conductivity. Repeated tests of transient responses revealed that the devices with an electronic channel layer with a relatively low permeability of ions showed suppressed diffusion-induced ion transport at the electrolyte-channel interface, eventually reaching the non-volatile characteristics. In conclusion, analyzing the dynamic behavior of ions and the resulting ion distribution within the gel electrolyte is essential for understanding the memory characteristics of electrochemical synaptic transistors.

PS2-095

Electro-Steric Ion Confinement in Polyelectrolyte Networks for Robust Nonvolatile Artificial Synapse

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Organic electrochemical synaptic transistors (OESTs) have garnered considerable attention as promising neuromorphic devices owing to their low operating voltage and high ionic sensitivity. Nevertheless, realizing nonvolatile synaptic behavior in OESTs remains fundamentally challenging because ion relaxation is governed by electrolyte-level transport and trapping rather than channel properties, thereby limiting channel-centric design strategies. To overcome this intrinsic trade-off, the stoichiometric composition of an ion-gating polyelectrolyte is modulated, offering a robust alternative to complex channel-centric modifications. This study demonstrates that a poly(styrene sulfonate) (PSS)-dominated architecture (1PAA–3PSS) induces a distinct dual-confinement mechanism that transforms ion relaxation kinetics from a diffusion-dominated regime to a trap-controlled regime. In this electrolyte architecture, synergistic steric and electrostatic confinement effectively immobilizes doped ions at the channel interface. This mechanism enables sustained electrochemical doping, as evidenced by the persistence of polaronic states for up to 1,200 s after bias removal. Consequently, the optimized OESTs exhibit outstanding nonvolatile synaptic retention, highly symmetric weight modulation, and robust switching endurance over more than 5,000 operation cycles. This work establishes a scalable, electrolyte-centric paradigm for regulating ion transport dynamics in high-performance neuromorphic and bioinspired electronic systems.

[1] Kim *et al.*, *Advanced Functional Materials*, 2026, e76235.

PS2-096

Molecular Engineering of Alkyl Side Chains for High-Performance Naphthalenediimide Polymer Cathodes

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Organic cathode materials have attracted increasing attention as sustainable and structurally tunable alternatives to conventional inorganic electrodes for rechargeable batteries. Among them, conjugated polymers are particularly promising because their redox properties, processability, solubility, and solid-state packing can be controlled through molecular design. Naphthalenediimide (NDI), a representative electron-deficient building block with reversible n-type redox behavior, is especially attractive for organic cathode applications.[1]

Here, we demonstrate that alkyl side-chain engineering is an effective strategy to enhance the electrochemical performance of NDI-based conjugated polymer cathodes. Shortening the alkyl chains reduces the fraction of electrochemically inactive mass, thereby increasing the theoretical capacity from 85.5 to 96.7 mAh g^{-1}. In agreement with this design principle, the experimentally observed discharge capacity increased as the alkyl chain length decreased.

Shorter alkyl chains also improved the rate capability. At a high current density of 2000 mA g^{-1}, the capacity retention increased from 46% to 60% with decreasing alkyl chain length. This enhancement is attributed to improved intermolecular packing of the conjugated backbones, which facilitates charge transport and redox-site accessibility. These results show that alkyl side chains govern both inactive mass and solid-state packing, highlighting side-chain engineering as an effective molecular design strategy for high-performance organic cathode materials.

[1] C. Yuk, et al., Angew. Chem. Int. Ed., 65, e202521805 (2026).

PS2-097

Layer-by-Layer-Assembled Polymer Capsules for Electron Transfer-Driven Lactate Sensing

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Disease onset and progression are often accompanied by alterations in the concentrations of specific metabolites, making them promising biomarkers for disease diagnosis and monitoring. For example, elevated lactate levels in body fluids have been associated with depression. Lactate is oxidized to pyruvate by lactate dehydrogenase (LDH), accompanied by the reduction of nicotinamide adenine dinucleotide (NAD^+) to its reduced form, NADH. The generated NADH exhibits intrinsic fluorescence with an emission maximum at 458 nm, enabling quantitative analysis of lactate based on fluorescence intensity. In addition, the fluorescence of a red-emissive conjugated polymer (CP) is efficiently quenched by NADH through electron transfer, providing an alternative fluorescence readout. Based on this mechanism, we developed polymer capsules by sequentially depositing conductive polymers via a layer-by-layer assembly process, encapsulating both LDH and CP for lactate sensing. The polymer capsules protect the encapsulated enzyme, enhance operational stability, and enable repeated use through facile recovery, providing a cost-effective and reusable metabolite sensing platform.

PS2-098

High-Spatial-Resolution Optical Pressure Sensing Using Chiral-Nematic Liquid Crystal Polymer Particles

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Photonic materials that convert mechanical deformation into optical signals have attracted growing attention for strain sensing in soft robotics and healthcare. Chiral-nematic liquid crystals (N* LCs) are particularly promising because they exhibit wavelength-selective Bragg reflection governed by their helical pitch; mechanical compression shifts the reflection wavelength, enabling colorimetric strain detection.[1] However, conventional N* LC elastomer films respond to macroscopic deformation averaged over their entire area, which limits the achievable spatial resolution of local strain mapping.
To overcome this limitation, we developed polymer particles incorporating N* LCs, in which the helical axes are three-dimensionally and radially oriented.[2-4] This radial architecture imparts angle-independent reflection and allows each particle to respond independently to local mechanical stimuli, thereby enabling high-spatial-resolution optical strain sensing at the single-particle level.
In this study, these N* LC polymer particles were applied as pressure-sensing elements, and their deformation and reflection wavelength changes under applied pressure were systematically characterized. The particles exhibited reversible reflection color changes in response to local deformation, and strain distributions were successfully mapped with a spatial resolution of approximately 10 μm. These results demonstrate that N* LC polymer particles with radially oriented helical structures provide a promising platform for high-spatial-resolution optical pressure sensing.

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PS2-099

Control of Internal Orientational Structures in Chiral Nematic Liquid Crystal Polymer Microparticles via Interfacial Anchoring

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The internal molecular orientation of liquid-crystalline polymer microparticles governs their optical functions, including selective reflection and structural coloration. In chiral nematic liquid crystals (N* LCs), the orientation of the helical axis within confined microparticles directly determines these photonic properties[1], making orientation control a key challenge in functional material design. However, the low molecular mobility of polymeric liquid crystals hinders long-range propagation of interfacial anchoring effects, and systematic control of the orientation throughout an entire microparticle has not been established.

In this study, we prepared N* LC polymer microparticles from copolymers bearing cyanobiphenyl (CB) and phenyl benzoate (PB) mesogenic units via a solvent-shift method. The internal molecular orientation depended strongly on the mesogenic structure: CB-based microparticles exhibited concentric orientation, while PB-based microparticles showed radial orientation, reflecting the distinct interfacial anchoring character of each mesogenic group. Moreover, microparticles prepared from a CB/PB copolymer (CB:PB:CD = 60:40:4) underwent reversible switching between concentric and radial orientations upon changing the interfacial anchoring conditions. These results demonstrate that interfacial anchoring provides an effective strategy for controlling long-range molecular orientation in chiral nematic liquid crystal polymer microparticles and enables switchable photonic structures through molecular design.

[1] L. Zhou, *et al*., *Crystals*, **14**, 934 (2024).

PS2-101

Synthesis of a Conjugated Polymer Photocatalyst and Evaluation of Its Photocatalytic Dye Degradation Performance

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Semiconductor photocatalysts are promising eco-friendly technologies that utilize electrons and holes generated from solar energy for applications such as pollutant degradation. In particular, TiO_2 is a widely studied photocatalyst due to its high chemical stability and cost-effectiveness. However, it has a limitation in that it can only be activated in the UV region because of its wide band gap. In this study, a visible-light-absorbing conjugated polymer (CP) was synthesized to enhance the visible-light response of TiO_2, and it was covalently introduced onto APTES surface-modified and Pt-photodeposited TiO_2 to fabricate a heterojunction photocatalyst, CP@Pt@TiO_2. TEM, XPS, and FT-IR analyses confirmed the successful fabrication of the photocatalyst. DRS analysis revealed enhanced visible-light absorption properties compared to bare TiO_2, and photocurrent, EIS, and PL analyses confirmed effective charge transfer as well as suppressed electron–hole recombination. The photocatalytic performance was evaluated through the photodegradation of rhodamine B (RhB), an organic pollutant. No significant degradation was observed under dark conditions. However, significant degradation was observed under

light irradiation without the use of additives. These results suggest that the introduction of CP is an effective strategy for enhancing the visible-light utilization and photocatalytic performance of TiO_2 photocatalysts.

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PS2-102

Polymer Electrochromic Displays with Transparent Capacitive Ion Storage Layers.

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Transparent capacitive ion storage layers are essential for electrochromic devices (ECDs) because they determine charge balance, electrochemical switching kinetics, optical neutrality, and bistability. However, their electrochemical structural dynamics and their relationship with ECD performance remain insufficiently understood compared with that of the active electrochromic material itself. Here, we investigate nanoengineered indium tin oxide (ITO) nanoparticles and PEDOT:PSS as transparent capacitive ion storage layers for p-type polymer-based ECDs. ITO nanoparticles show robust, optically neutral double-layer capacitance for fast ECD responses with high coloration efficiency, whereas PEDOT:PSS exhibits pseudo-capacitive mixed ionic/electronic transport with pronounced optical memory. By combining electrochemical analysis on morphological and crystalline dynamics, we reveal that ITO nanoparticles maintain stable morphology and crystallinity, while PEDOT:PSS undergoes electrochemically induced lamellar densification without surface degradation during electrochemical operation. PEDOT:PSS is further utilized as a capacitive transparent working electrode after polar-solvent vapor annealing, which provides high electrical conductivity and a mixed-conducting capacitive interface adjacent to the electrochromic polymers. When combined with interfacial charge-buffering PEDOT:PSS electrodes and optically passive nanoengineered ITO, the polymeric ECDs exhibit large optical density, fast coloration and bleaching responses, and excellent optical memory.

PS2-103

Photochromic Spiropyran-Functionalized Mesoporous Silica for Optochemical Metal Ion Sensing

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Mesoporous silica (SBA-15) was synthesized under acidic conditions via a self-assembly process using the triblock copolymer P123 ($PEO_{20}PPO_{70}PEO_{20}$) as a template and tetraethyl orthosilicate (TEOS) as the silica source. SBA-15 exhibited a high surface area (698 m^2g^{-1}), uniform mesopores (8.3 nm), and a well-ordered hexagonal mesostructure. Spiropyran-functionalized SBA-15 (SP-SBA-15) was prepared by post-synthesis modification of SBA-15 using 3-(triethoxysilyl)propyl isocyanate (TESPI) and 1-(2-hydroxyethyl)-3,3-dimethylindolino-6′-nitrobenzopyrylo-spiran (HDINS). The photochemical properties of SP-SBA-15 were utilized to investigate the sensing behavior toward various metal ions (Ni^{2+}, Co^{2+}, Cd^{2+}, Cu^{2+}, Fe^{3+}, Pb^{2+}) in aqueous solution. For SP-SBA-15 that was not exposed to UV light, the intensity of the UV-vis absorption peak at 632 nm showed little change in the presence of Fe^{3+}, whereas it decreased markedly in the presence of the other metal ions. In contrast, when SP-SBA-15 was exposed to UV light and then contacted with various metal ions (Ni^{2+}, Co^{2+}, Cd^{2+}, Cu^{2+}, Fe^{3+}, Pb^{2+}),

a pronounced decrease in the intensity of the UV-vis absorption peak was observed specifically for Cu^{2+}. The behaviors are attributed to the formation of complexes between the spiropyran or merocyanine chromophores and the metal ions in SP-SBA-15, depending on whether UV irradiation is applied.

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PS2-104

Dielectric Additive Enables Humidity-Independent Preparation of Blend Morphology for High-Performance, Large-Area Organic Photovoltaics

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Achieving robust morphology control during scalable coating remains a central challenge for organic photovoltaics (OPVs), particularly under variable ambient humidity. Here, we report carvone (CV) as a dielectric additive that enables humidity-independent preparation of high-quality bulk-heterojunction morphology in large-area OPVs. Spectroscopic and theoretical analyses indicate that CV forms a noncovalent complex with the acceptor L8-BO, modulating intermolecular interactions and slowing premature aggregation during film formation. This dielectric interaction broadens the processing window and stabilizes active-layer assembly under humid conditions, leading to uniform phase separation and favorable molecular packing over large coating areas. As a result, slot-die-coated devices and modules exhibit improved reproducibility, reduced humidity sensitivity, and enhanced power conversion efficiency. Notably, large-area OPV modules processed with CV achieved a certified power conversion efficiency of 14.84%, highlighting the practical value of dielectric-additive engineering for scalable manufacturing. These results demonstrate a viable strategy for translating high-efficiency OPV materials into reliable, ambient-processable large-area energy devices.[1]

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PS2-105

Plasticizer-Free Chiral-Nematic Liquid Crystal Elastomers with Room-Temperature Mechanochromic Responses

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Technologies for visualizing force and strain are required in various fields, including soft robotics and wearable electronics. Chiral nematic liquid crystal elastomers (N* LCEs) are promising optical strain-sensing materials because stretching deformation compresses their helical pitch and shifts the selective Bragg reflection wavelength, enabling colorimetric detection of applied strain. However, conventional acrylate-based N* LCEs require low-molecular-weight plasticizers to lower the glass transition

temperature (T_g) below room temperature, and these plasticizers may bleed out during repeated deformation, compromising long-term reliability.
To address this limitation, we synthesized crosslinked chiral liquid crystalline polymers with polyether backbones to realize plasticizer-free N* LCEs. The resulting elastomers exhibited reversible mechanochromic responses at room temperature without the use of low-molecular-weight plasticizers, and their reflection wavelength systematically shifted with applied strain. These results demonstrate that polyether-based molecular design provides an effective strategy for developing plasticizer-free mechano-optical photonic materials.

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PS2-106

Synthesis of Crosslinked Chiral Nematic Liquid Crystal Polymer Microparticles Using Liquid Crystal Crosslinkers

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Liquid crystal polymer microparticles exhibit unique optical functions owing to their controllable internal refractive-index distribution derived from molecular orientation. However, conventional liquid crystal polymer microparticles can dissolve in organic solvents, and their molecular orientation may be disrupted at elevated temperatures, making it difficult to maintain their optical properties. To overcome these limitations, we designed and synthesized a liquid crystal crosslinker for preparing crosslinked chiral nematic liquid crystal polymer microparticles.
Crosslinked microparticles were successfully prepared using the liquid crystal crosslinker. Polarized optical microscopy confirmed that the liquid-crystalline orientation was retained after crosslinking. The resulting particles also showed improved solvent resistance and thermal stability in qualitative tests. These results demonstrate that liquid crystal crosslinkers provide an effective molecular design strategy for developing structurally stable chiral nematic liquid crystal polymer microparticles.

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PS2-107

Bisthienylbutadiene diimide (BTBI) Based Donor-Acceptor Conjugated Polymers: Tuning Energy Levels for OECT Performance

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Bisthienylbutadienediimide (BTBI)-based acceptor units remain largely unexplored in the field of organic electrochemical transistors (OECTs). Herein, we report the synthesis of donor-acceptor (D-A) conjugated polymers based on a new acceptor unit, BTBI. Stille coupling polymerization was performed using three donor units (thiophene, 3,4-ethylenedioxythiophne, and 2,2'-bithiophene). Calculations based on the density functional theory revealed that BTBI-EDOT exhibits a higher-lying HOMO level (*ca.* -5.0 eV) compared to BTBI-T (*ca.* -5.4 eV), indicating a more favorable energy structure for p-type OECT operation. Additionally, optical absorption spectra of the synthesized polymers showed absorption bands at 550–950 nm. These results demonstrate that the energy level of BTBI-based D-A

conjugated polymers can be effectively tuned by varying the donor unit. Further study will focus on optimization of polymerization conditions to yield a high-molecular-weight batches and to enhance the charge-carrier transport characteristics.

PS2-108

Low-Temperature Strength Development in Iron Ore Pellets Using a Water Glass-Moisture Curable Hybrid Binder

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Conventional iron ore pellet production requires an energy-intensive induration process at temperatures. Cold-bonded pelletization has emerged as a promising alternative due to its lower energy requirement, reduced environmental impact, and simplified processing route [1]. However, the development of binder systems capable of providing adequate pellet strength while maintaining favorable porosity remains a major challenge. In this study, a hybrid binder comprising 2 wt% water glass (WG) and 1 wt% moisture-curable binder (MC) was evaluated for strength development, thermal stability, and porosity. Heat treatment significantly enhanced pellet strength. After curing for 1 h, the hybrid system achieved compressive strengths of 713.88 N and 728.82 N at 100 °C and 150 °C, respectively. The enhanced strength is attributed to the combined effects of silicate condensation and moisture-curable binder hardening during thermal treatment, resulting in improved particle bonding and resistance to crack formation. The pellets maintained superior strength up to 300 °C, while porosity increased from 17.76% at 105 °C to 19.81% at 300 °C, which may facilitate gas transport during subsequent reduction processes. These results demonstrate that the WG-MC hybrid binder provides an effective balance between mechanical strength and porosity.

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PS2-109

Systematic Tuning of Energy Levels in EDOT-Based D-A-D Monomers via Acceptor Engineering

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3,4-Ethylenedioxythiophene (EDOT) has been widely used in organic electronic fields owing to its strong electron-donating ability. However, limited studies have explored the modulation of EDOT-based polymer properties at the monomer level. Herein, we systematically tuned the energy levels of EDOT-based D-A-D monomers by varying the acceptor unit via Stille coupling. UV-vis-NIR spectroscopy was performed to investigate the bandgap shift corresponding to the energy levels of the monomers. Monomers with weaker acceptors exhibited the main absorption peak at shorter wavelengths, whereas those with stronger acceptors showed a redshifted peak, corresponding to a smaller bandgap. This bandgap narrowing is attributed to the deeper LUMO level induced by the strong acceptor units. DFT calculations were performed to support the absorption spectra, revealing a direct correlation between the calculated bandgap and the LUMO level of each acceptor. Successful monomer synthesis was

confirmed by NMR spectroscopy, and residual tributyltin byproducts from Stille coupling were effectively removed through optimized KF, and hexane washing. These results provide a deeper understanding of how acceptor strength governs the energy levels of EDOT-based monomers and establish a rational framework for the future design of EDOT-based donor-acceptor conjugated polymers.

PS2-110

Evaluation of photocatalytic activities of graphitic carbon nitride and chalcogenide composites

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Water pollution is a serious global issue that poses a significant threat to ecosystems and human health. To address this problem, visible-light-responsive photocatalysts for environmental remediation have attracted considerable attention. Graphitic carbon nitride (g-C_3N_4) is considered a promising photocatalyst due to its high chemical stability, low toxicity, and visible-light responsiveness. However, the rapid recombination of photo-generated electron-hole pairs hinders its practical application. Combining g-C_3N_4 with antimony chalcogenide semiconductors is being explored as an effective approach to overcome this challenge [1,2]. Antimony chalcogenides are promising semiconductor materials characterized by high stability, a suitable (and tunable) bandgap, and a high light-absorption coefficient. In particular, for antimony sulfide-selenide ($Sb_2(S_xSe_{1-x})_3$), it has been reported that the bandgap and energy band positions can be continuously tuned by varying the composition ratio (x) [3]. In this study, we report the fabrication of composites consisting of g-C_3N_4 and antimony sulfide-selenide with varying composition ratios (x), and the evaluation of their photocatalytic performance through the degradation of organic compounds under visible-light irradiation.

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PS2-111

Novel Crosslinked Soluble Polyimide as a Gate Insulator for High Performance Organic Thin-Film Transistors

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The hydroxyl group substituted soluble polyimide (DOCDA-6FHAB) was synthesized with a simple one step condensation polymerization using the monomers, 5-(2,5-dioxytetrahydrofuryl)-3-methly-3-cylohexene-1,2-dicarboxylic anhydride (DOCDA), and 5,5'-(perfluoro propane-2,2-diyl)bis(2-aminophenol) (6FHAB). Synthesized soluble polyimide (DOCDA-6FHAB) was further crosslinked with a (hydroxymethyl)benzoguanamine (HMBG) as cross-linking agent at very low temperature. We found conditions using this HMBG cross linker that allows lowering of the thermal budget of the cross linking reaction to 160 ^{o}C. Thin film properties of a new low temperature crosslinked polyimide were

systematically characterized such as chemical structures, surface roughness, surface energy, thermal stability, and capacitance, etc. A crosslinked DOCDA-6FHAB film showed low leakages current density in metal-insulator-metal (MIM) devices. The leakage current density and breakdown voltage of a crosslinked DOCDA-6FHAB were found to be less than $9.1x10^{-10}$ A/cm^2 at 1 MV/cm and above 3 MV/cm. In addition, we have fabricated pentacene TFT using crosslinked DOCDA-6FHAB with HMBG as a gate dielectric with bottom gate-top contact configuration (channel length L = 100 μm and width W = 1500 μm). Pentacene TFT showed field effect mobility as 0.205 cm^2/Vs and did not show any hysteresis during forward and reverse gate voltage sweep between -30 V and +10 V.

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PS2-112

Electrolyte-Gated Transistors based on Bio-based Electrolyte Components

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Electrolyte-gated transistors (EGTs) are attractive candidates owing to their low operating voltage, yet most reported devices still rely on synthetic polymers and molecular salts whose limited degradability and/or poor biocompatibility can be a growing concern. Here, we report eco-friendly EGTs based on a biomaterial-based electrolyte. The bio-electrolyte can be made of a protein as a film-forming matrix, a choline as a cation, and an acid as both the solvent and the anion, which are all derived from nature. Choline paired with the acidic solvent supplies mobile ions in the bio-electrolyte. This protein-based electrolyte removes the need for conventional synthetic polymers while preserving device performance. To examine whether the platform generalizes beyond a single carrier type, we paired it with a p-type poly(3-hexylthiophene) and, separately, an n-type metal-oxide semiconductor based on indium and gallium. In each configuration, the transistors switched reliably and delivered on/off current ratios of roughly 10^4, on par with synthetic-electrolyte counterparts. These findings indicate that coupling solution-processed semiconductors with nature-derived electrolytes opens a practical route toward sustainable, bio-integrated electronic systems.

PS2-113

Optical Properties of Electron-Beam-Patterned Ag Nanohole Array Electrodes and Their Applicability to OLEDs

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Organic light-emitting diodes (OLEDs) are limited by low light-extraction efficiency. A nanohole array (NHA), a metal film with periodic nano-apertures, combines conductivity with transparency, and its visible response can be tuned through the array periodicity, making it attractive as a transparent electrode. Using character-projection electron-beam lithography (CP-EBL) and reactive ion etching (RIE), our

group has fabricated uniform Al-NHAs [1]. Here we focus on Ag, which has relatively low optical loss in the visible, and assess Ag-NHA electrodes and their applicability as OLED anodes. Hexagonal Ag-NHAs with periods of 460, 480, and 500 nm were fabricated from 20-nm Ag films on quartz and characterized by transmission/reflection (T/R) spectroscopy with finite-difference time-domain (FDTD) simulations. The arrays showed a transmission band reaching about 60% in the visible and a broad transmission band above 700 nm; transmission dips coincided with reflection peaks and varied with periodicity. FDTD reproduced these features, indicating that a localized plasmonic response near the hole edges and a periodicity-mediated surface-wave/diffractive response jointly govern the behavior. OLEDs using Ag-NHA anodes (MoO_3/α-NPD/Alq_3/LiF/Al) exhibited green Alq_3 emission, confirming preliminary device operation. However, the device performance was still limited, indicating that further optimization of the electrode fabrication and OLED integration processes is required.

[1] K. Ikeda *et al.*, *Vacuum*, **253**, 115579 (2026).

PS2-114

Evaluation of Photocatalytic Activity of Graphitic Carbon Nitride Composites for the Degradation of Organic Pollutants

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Graphitic carbon nitride (g-C_3N_4) is a semiconductor with a bandgap energy of approximately 2.7 eV; it has been extensively studied as a visible-light-responsive photocatalyst due to advantages such as ease of synthesis and high structural stability. However, its photocatalytic activity is limited by the high recombination rate of photo-generated electron-hole pairs, prompting the development of various g-C_3N_4-based composite photocatalysts. Magnéli phase titanium oxide (Ti_4O_7)—a type of substoichiometric titanium oxide—is attracting attention as a promising co-catalyst capable of facilitating electron transfer, owing to its high electrical conductivity and abundance of oxygen vacancies. In this study, we prepared composite materials consisting of g-C_3N_4 and various metal oxide semiconductors including Ti_4O_7 using different methods, and we report the results of evaluating and comparing their photocatalytic activity in the degradation of hazardous organic compounds.

[1] Yilong Yang *et al*, *Front. Chem.*, 10, 955065(2022).
[2] Wenduo Yang *et al, Chem. Eur. J.*, 30, e202402188(2024).
[3] Wei Guan *et al. Front. Chem.*, 6, 37(2018).
[4] Wei Guan *et al. Front. Chem.*, 6, 313(2018).

PS2-115

Enhancing visible-light harvesting of Pt-loaded TiO_2 through conjugated polymer integration

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Visible-light-responsive photocatalysts have attracted considerable attention for efficient solar energy utilization. However, the wide bandgap of TiO_2 prevents efficient harvesting of visible light, limiting its overall photocatalytic performance. To enhance the visible-light photocatalytic activity of TiO_2, the conjugated polymer PhNa-BT was integrated with Pt-loaded TiO_2 through electrostatic interactions. The immobilization of PhNa-BT on the TiO_2 surface was confirmed by FT-IR, XPS, and zeta potential analyses. The incorporation of PhNa-BT expanded light absorption into the visible region, as confirmed by diffuse reflectance spectroscopy. Furthermore, photocurrent measurements showed an enhanced photoresponse, while electrochemical impedance spectroscopy revealed reduced charge-transfer resistance, indicating more efficient charge separation and interfacial charge transport in the hybrid system. Photocatalytic performance was assessed using rhodamine B (RhB) degradation under visible-light irradiation. PhNa-BT/Pt-loaded TiO_2 exhibited enhanced RhB degradation under visible-light irradiation, whereas only minimal degradation was observed in the absence of the photocatalyst. These findings highlight conjugated polymer integration as an effective approach for enhancing the visible-light response and photocatalytic activity of TiO_2.

[1] J. W. Jo, et al., Org. Electron., 50, 1 (2017).
[2] H. Kim, et al., Mater. Des., 203, 109630 (2021).

PS2-116

Highly Crystalline Bisthienylbutadiene Diimide (BTBI)-based Copolymers for n-Type Organic Field-Effect Transistors

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A new electron-deficient building block, bisthienylbutadiene diimide (BTBI) was synthesized through the imide functionalization of bisthienylbutadiene (BTB). The BTBI copolymers, P(BTBI-T2), P(BTBI-T2F2), and P(BTBI-V) showed highly crystalline lamellar packing structures with lamellar spacings of 2.36−2.43 nm and mean crystalline domain sizes of 12−21 nm. Depending on the donor unit, lamellar diffraction peaks up to the {500} order was observed, indicating a preferential edge-on orientation that is favorable for charge transport. The average field-effect electron mobility of annealed P(BTBI) films was up to 5.8×10^{-2} cm^2 V^{-1} s^{-1}. These results highlight the potential of BTBI-based copolymers as high-performance *n*-type polymer semiconductors.

PS2-117

Cross-Linked Polyimide Gate Dielectric through Thermal Click Chemistry for Low Temperature Processable Organic Thin Film Transistor

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Over the past few decades, organic dielectric materials for thin-film transistors (TFT) have attracted considerable interest due to their numerous advantages, such as low cost, ease of fabrication, and suitability for large-area processing. Various polymers, such as poly(4-vinylphonol) (PVP), poly (methyl methacrylate), poly(vinyl alcohol) (PVA) and polyimide (PI) have been investigated as

alternatives to inorganic dielectrics. The quest for flexible electronic devices has continually emphasized the importance of improving the reliability of dielectric materials. Among various polymer materials, polyimide (PI) has garnered attention as a promising solution-processable polymer dielectric for electronic device applications. Here, we report a new cross-linker, 1,3,5-tris(2-propynyloxy)benzene (TYB) for cross-linked PI gate dielectric, which can be cross-linkable at very low temperature 100 ^{o}C. Firstly, azide functionalized soluble polyimide is synthesized, and then cross-linking occurs through azide-alkyne cycloaddition reaction with a 1,3,5-tris(2-propynyloxy)benzene (TYB) cross-linker. The metal-insulator-metal (MIM) devices show that they show good leakage current density ($3.09x10^{-8}$ A/cm^2 at 1 MV/cm) and dielectric constant (3.42) even when cross-linked at very low temperature. Also, it shows good mobility (0.404 cm^2/Vs) and on/off ratio ($1.25x10^5$) through the pentacene TFT. Detailed polyimide synthesis method and film fabrication condition will be presented.

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[2] T. Ahn, *et al*., *Org. Electron*., **10**, 12 (2009).
[3] X. Shang, *et al*., *Chem. Mater*., **12**, 71 (2002)

PS2-118

Dimensional and Morphological Evolution of Quinone–Benzimidazole COFs via Out-of-Plane Stacking Control

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Covalent organic frameworks (COFs) have emerged as promising organic platforms for multifunctional applications; however, conventional designs heavily rely on in-plane conjugation, often neglecting the crucial role of out-of-plane stacking behaviors. In this work, we report a series of quinone–benzimidazole (QBI) COFs synthesized by condensing 2,3,5,6-tetraaminobenzoquinone with structurally distinct aldehyde nodes. We demonstrate that systematic variations in monomer geometry combined with synthetic parameter tuning effectively regulate interlayer slipping and out-of-plane assembly orientation. Through this stacking-driven approach, we successfully realized a distinct dimensional evolution of QBI-COFs into 1D needles, 2D sheets, and 3D polyhedral morphologies. Furthermore, a Schiff-base modulator was strategically introduced to optimize the crystalline growth pathways of the 1D morphology. Collectively, these findings establish out-of-plane stacking control as a powerful and generalizable design principle for engineering COF morphology and dimensionality, offering a broadly applicable synthetic strategy for accessing multi-redox active frameworks for advanced energy storage and environmental remediation.

PS2-119

Modulation of Dielectric Properties and Molecular Assembly Structures via Photoisomerization of *tert*-Butylcamphorquinoneimine.

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Molecules capable of photoisomerization are promising candidates for photoresponsive functional devices, as their physical properties can be significantly modulated through photoisomerization.[1] However, solid-state photoisomerization is still challenging.
Chiral *tert*-butylcamphorquinoneimine (= **1**) is known to exhibit solid-state photochromism but the details of photoisomerization and the effects on structures and physical properties remain unexplored.[2] In this study, we investigated the chirality effects on molecular assembly structures, phase transition behaviors and dielectric responses in addition to photoisomerization-induced modulation of the dielectric response of **1**. In the dark, slight dielectric response indicating the reorientational motion of **1** was observed. By contrast, under UV (365 nm, 20 mW/cm^2) irradiation, significant increase in dielectric constant were observed as well as pronounced changes in the temperature and frequency dependences (Fig. 1). These results suggest that photoisomerization markedly affects the molecular dynamics and dielectric behavior in the solid state. In this presentation, the photoisomerization-induced changes in molecular assembly structures and dielectric properties, together with a comparative analysis of the homochiral and racemic forms will be discussed.

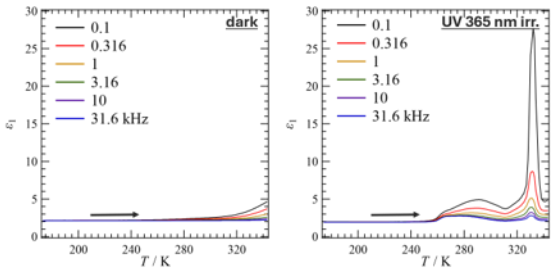

Fig.1 UV irradiation effect on Real part of dielectric constants (ε_1) of **1**-(*R*).

[1] H. Nishikawa *et al.*, *Nature Commun.*, **2022**, 13, 1142.
[2] L. Greb *et al.*, *Angew. Chem. Int. Ed.*, **2015**, 54, 1434.

PS2-120

Cyclo-aliphatic CHMA-incorporated Tackifier : A Viscoelastic-Tuning Strategy for Robust Optically Clear Adhesives

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With the rapid advancement of flexible displays, the demand for Optically Clear Adhesives (OCAs) balancing high transparency and mechanical reliability is increasing. Conventional OCAs often suffer from limited durability against external stress. To address these challenges, this study introduces a novel strategy by incorporating a cyclo-aliphatic cyclohexyl methacrylate (CHMA)-based tackifier. The CHMA-incorporated tackifier was synthesized and blended with an acrylic base resin to prepare the OCA. The thermal, mechanical, and optical properties of the fabricated OCA were systematically evaluated. Benefiting from the steric hindrance of the cyclo-aliphatic ring, the OCA exhibited an outstanding optical transmittance of over 95% in the visible light range via UV-Vis spectroscopy. Furthermore, the fabricated OCA demonstrated a significantly enhanced peel strength of over 20 N/25mm measured by a universal testing machine (UTM). In conclusion, the proposed CHMA-based tackifier provides a robust and transparent solution for next-generation display applications.

PS2-121

Tert-Butyl-Substituted Carbazole-Based Hosts for Electrochemically and Morphologically Stable Blue PhOLEDs

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The development of stable and efficient host materials remains a critical challenge for high-performance blue phosphorescent organic light-emitting diodes (PhOLEDs). Herein, we present a new class of carbazole-based host materials functionalized with tert-butyl groups at the C3 and C6 positions. This molecular design is specifically engineered to enhance the electrochemical stability and morphological robustness of n-type host systems.
To demonstrate the capabilities of these materials, the hosts were incorporated into blue PhOLEDs utilizing the platinum-based emitter Platinum(II) [2-[3-[3-[3,5-bis(1,1-dimethylethyl)phenyl]−1H-benzimidazol-1-yl-κC2]phenoxy-κC2]−9-[4-(1,1-dimethylethyl)−2pyridinyl-κN]−9H-carbazo-lato(4-)-κC1]. In these system configurations, the introduction of tert-butyl substituents at the C3 and C6 positions of the carbazole core serves to enhance stability and robustness within the emitting layer under operation.
Consequently, the fabricated blue PhOLED devices exhibit significantly prolonged operational lifetimes. Furthermore, the implementation of these specific host materials yields improved color purity, a parameter directly quantified by the Blue Index. Therefore, this study highlights a promising molecular design strategy focused on strategic functionalization at the C3 and C6 positions, providing a clear pathway for advancing both the operational stability and efficiency of next-generation blue PhOLEDs.

PS2-122

A design strategy of N-type host for suppressing exciton induced degradation in PhOLEDs

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This study presents a novel molecular design strategy aimed at significantly enhancing the operational lifetime of organic light emitting diodes utilizing platinum (Pt) dopants. The core approach focuses on precisely tuning the excited-state energy levels of the material. Specifically, the molecular architecture is engineered to minimize the singlet-triplet energy gap ΔE_{st} by lowering the excited singlet state (S_1) energy so that it closely aligns with the triplet state (T_1) level. Concurrently, the T_1 energy is strictly maintained at a level higher than that of the Pt dopant to ensure efficient device performance. By minimizing the ΔE_{st}, the structurally unstable excitons localized in the T_1 state can rapidly undergo reverse intersystem crossing (RISC) back to the S_1 state. This accelerated RISC process effectively suppresses exciton accumulation and molecular degradation that typically occurs in the prolonged T_1 state. Furthermore, the intentionally lowered S_1 energy serves to suppress potential photochemical degradation reactions that often take place within the S_1 state. Therefore, suppressing both degradation pathways through precise energy level tuning will fundamentally enhance the overall longevity of the devices.

PS2-123

Hierarchical Photonic Structures in Chiral Nematic Liquid Crystal Polymer Microparticles via Polymerization Rate Control

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Chiral nematic liquid crystal (N* LC) polymer particles with radially oriented helical axes exhibit angle-independent selective Bragg reflection, making them attractive building blocks for photonic applications. In these particles, the reflection wavelength is governed by the local helical pitch, which depends on the concentration of the chiral component. Therefore, creating a spatial distribution of the chiral component within the particles could enable hierarchical photonic structures with gradient optical properties.[1,2] In this study, liquid crystal monomers with different polymerization rates were copolymerized with a chiral monomer to control the internal structure of N* LC polymer microparticles. Differences in polymerization rate induce a spatial concentration gradient of the chiral monomer during particle formation, leading to hierarchical internal structures with spatially varying helical pitch. Optical microscopy and spectroscopic characterization revealed that the resulting particles exhibited distinct optical properties arising from the hierarchical orientation structure. These results demonstrate that controlling polymerization kinetics provides a new molecular design strategy for engineering programmable photonic structures in chiral nematic liquid crystal polymer microparticles.

[1] T. Shigeyama, *et al.*, *Molecules*, **28**, 7779 (2023).
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PS2-124

Entropy-protected stabilization of multiple-resonance emitters for long-lived deep-blue OLEDs

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Blue multiple-resonance emitters offer exceptional color purity but have yet to achieve the operational stability required for commercialization.[1] Here, we introduce an “entropy-protection” strategy in which a bridge moiety is incorporated into the DABNA[2] framework, effectively suppressing the entropy gain associated with bond dissociation without perturbing the intrinsic electronic structure. As a result, the bond dissociation free energy (BDE(*G*)) of the vulnerable C–N bond increases substantially. Beyond stabilization, the entropy-protected architecture improves color purity while slightly blue-shifting the emission. The bridged emitter achieves an operational lifetime of 229.7 h at 80% of the initial luminance at 1,000 cd m^{-2}, representing over a 4.5-fold improvement over the reference emitter (50.9 h). These results establish entropy-protected molecular design as a general strategy for enhancing molecular stability without perturbing intrinsic electronic functionality, providing a new design principle for long-lived organic optoelectronic materials.

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[2] Hatakeyama, T. *et al. Adv. Mater.* **28**, 2777–2781 (2016).

PS2-125

Single-Component CPL-Sensitive Photodiodes Enabled by Light-Induced Chirality in a Conjugated Polymer

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Direct, compact detection of circularly polarized light (CPL) without bulky external optics remains a key challenge for chiroptical sensing and photonic–spintronic applications.[1] Most reported strategies rely on chiral small molecule dopants or chiral side chain engineering to preset a preferred helical sense.[2] Here, we report a light-programmable conjugated polymer thin-film platform in which the supramolecular handedness of an initially achiral polymer is selected by the handedness of CPL during photoinduced assembly. The conjugated polymer undergoes photoinduced self-assembly into helical aggregates in the solid state. By irradiating the film with left- or right-handed CPL, the supramolecular chirality of the aggregates is selectively biased, producing mirror image chiroptical responses without introducing molecular chirality into the polymer backbone. These CPL-programmed chiral films were integrated as the active layer of photodiodes, enabling discrimination between left- and right-handed CPL through polarization dependent photocurrent. This strategy demonstrates that circular polarization can serve not only as an optical probe but also as a processing parameter to encode chiral order in conjugated polymer semiconductors. Our approach offers a route to supramolecular chirality and electrically active nanostructures from achiral building blocks, providing a simple, scalable platform for compact CPL photodetectors and chiral optoelectronics.

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[2] J. Cheng, *et al*., *J. Mater. Chem. C*, **8**, 9271-9275 (2020).

PS2-126

Regioselective Fluorination of Thiophene-Based Building Blocks for Organic Semiconductors

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Thiophene-based heterocycles are key building blocks for π-conjugated organic semiconductors, and fluorination is an effective strategy for tuning their energy levels and molecular interactions. However, regioselective fluorination remains synthetically challenging, and fluorinated bithiophene (T2) and dithienylethene (TVT) derivatives are typically prepared from prefluorinated precursors through multistep routes.

Here, we report a solvent-controlled direct fluorination method that enables the regioselective mono- and multifluorination of thiophene-based heterocycles. The distinct reactivities of lithiated aggregates formed in different solvents provide mechanistic insight into the observed site selectivity. The optimized protocol was applicable to a range of substrates, providing efficient access to diverse fluorinated thiophene derivatives. Structure–property analyses further revealed that the number and position of fluorine substituents influence energy levels, molecular planarity, and solid-state packing. These results demonstrate the utility of solvent-controlled direct fluorination for preparing structurally defined fluorinated thiophene derivatives and provide design guidelines for thiophene-based organic semiconductors.

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PS2-127

Machine Learning Prediction of Helical Twisting Power for Stereogenic-Centre-Based Dopants in Chiral Nematic Liquid Crystals

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Chiral nematic liquid crystals are promising photonic materials because their periodic helical structures selectively reflect a circularly polarized light within a wavelength range determined by their helical pitch.[1] This wavelength-selective response has attracted considerable interest for reflective displays, optical filters, sensors, and other light-controlling materials. The helical pitch is governed by the concentration and helical twisting power (HTP) of the chiral dopant; therefore, controlling HTP at the molecular level is essential for designing photonic materials with targeted reflection wavelengths. However, HTP cannot be predicted from molecular chirality alone because chirality transfer to the surrounding liquid-crystal host depends on molecular conformation, rigidity, shape, and host–dopant interactions.[2] Establishing systematic relationships between molecular structure and HTP is therefore important for accelerating material screening and providing design guidelines for unexplored chiral dopants.
In this study, we developed a machine-learning model to predict HTP from molecular descriptors of 166 chiral dopants with stereogenic centres. The model achieved $R^2 = 0.72$ and MAE = 8.9 μm^{-1}. Feature-importance analysis identified molecular rigidity, aromaticity, heteroatom content, host compatibility, and shape anisotropy as key factors governing HTP. These findings provide molecular design guidelines for the rational selection of chiral dopants and establish a machine-learning framework for the inverse design of photonic materials with tailored reflection wavelengths.

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[2] S. Pieraccini, *et al*., *Chem. Soc. Rev*., **40**, 258 (2011).

PS2-128

Polarization Voltage Lowering of Ferroelectric PVDF-TrFE films by Oxide Buffer Layers

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Ferroelectricity is an interesting property of materials with spontaneous and/or bistable polarization, useful for storage of both energy and information. Ferroelectric polymers have been considered as an element for flexible and solution-processable non-volatile memory devices. However, their high operating voltage (typically, V_{op}>20 V) has hindered their practical adoption. The operating voltage is governed by its coercive field (E_c) and its thickness (t) through $V_{op} \approx E_c \cdot t$, and both components are relatively large in polymers. Here, we study how the operating voltage can be lowered in a thin PVDF-TrFE layer sandwiched between ultrathin aluminum oxide layers. The oxide buffer layers with a high dielectric constant play a dual role: a capacitive voltage divider that concentrates the applied field across the ferroelectric and a leakage-suppressing barrier that enables stable operation of thinner films. By co-

optimizing the ferroelectric thickness and buffer design, we obtain clear polarization and hysteresis with an operating window near 3 V, a roughly five-fold reduction relative to conventional single-layer devices. P–E loops and C–V butterfly characteristics in a metal-insulator-metal capacitor confirmed genuine ferroelectric switching at the voltage.

PS2-129

Two-step electrical response in novel class of dumbbell-shaped plastic crystal

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A plastic crystal (PC) phase is a mesophase between crystal and isotropic liquid (IL) phases, where molecular orientations are dynamically disordered while maintaining the crystal lattice. Recently, our group first reported a ferroelectric-like behavior in a dynamically disordered PC phase,[1] and proposed PCs' possibilities as unique solid-state nonlinear materials. However, molecular design of PCs remains limited to an empirical rule of globular shape, which hinders the diversification of functional PC materials. Herein, we designed a dumbbell-shaped molecule, 1*S*-**ADCH$_2$CS**, composed of adamantane (**AD**) and camphor (1*S*-**CS**) moieties (Fig. a), and investigated its electrical responses.

DSC, PXRD, and POM observations revealed that 1*S*-**ADCH$_2$CS** exhibits a PC phase between approximately 430 and 300 K upon cooling, despite its non-globular molecular shape (Fig. b). In this PC phase, dielectric relaxations indicating molecular motions were observed in *f*-dependence of ε_1 (Fig. c). Importantly, ferroelectric-like *P*–*E* hysteresis loops were observed (Fig. d), and the corresponding *J*–*E* curves exhibited two peaks (Fig. e). Since 1*S*-**ADCH$_2$CS** possesses multiple dynamic degrees of freedom,[1] the two-step behavior arises from the molecular rotational and conformational dynamics in response to electric field. We successfully realized unconventional dielectric functionality in a new class of PC using a chiral dumbbell-shaped molecule.

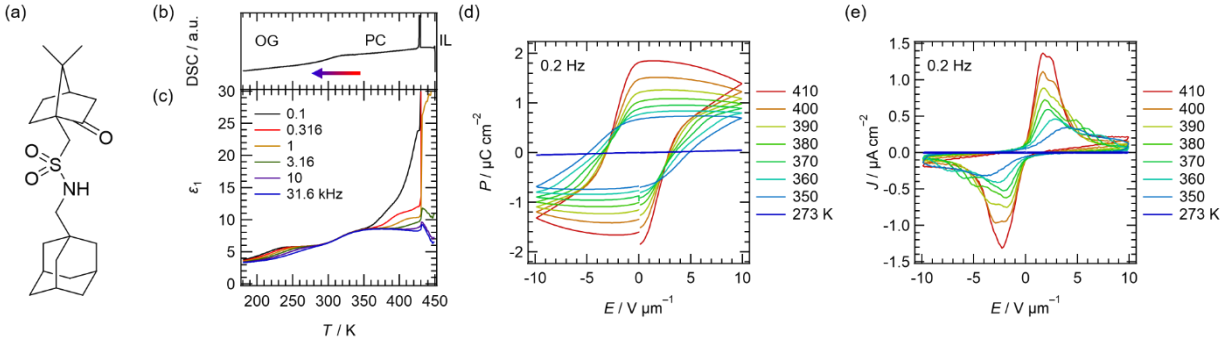

Fig. (a) Molecular structure, (b) DSC chart, (c) *T*- and *f*-dependent the real part of the dielectric constant (ε_1), (d) *T*-dependent *P*–*E* curves, and (e) *J*–*E* curves at 0.2 Hz of 1*S*-**ADCH$_2$CS**. The abbreviation OG in (b) denotes orientational glass.

[1] N. Onodera, *et al.*, *J. Am. Chem. Soc.*, **147**, 19200 (2025).

PS2-130

Moisture-Triggered Reconfigurable Perovskite Crystallization for Air-Processed Perovskite Solar Cells

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Air-processed lead halide perovskite films offer a scalable and cost-effective manufacturing route for solar cell fabrication but remain challenging because ambient moisture disrupts perovskite crystallization and promotes defect formation. Here, we propose a reconfigurable additive strategy based on chlorodiphenylphosphine (Ph_2PCl) for air-processed perovskite solar cells. Upon exposure to trace moisture during film formation, Ph_2PCl is expected to undergo hydrolytic cleavage of the P–Cl bond, dynamically generating chloride species together with phosphorus-containing products. We hypothesize that the released chloride transiently regulates crystallization kinetics through intermediate-phase formation, promoting enlarged grains and improved film uniformity. Meanwhile, the hydrolysis products are expected to passivate undercoordinated Pb sites, enabling in-situ defect passivation and suppressing non-radiative recombination. This moisture-triggered chemical transformation allows the additive to reconfigure its functionality during film formation, simultaneously regulating crystal growth and interfacial defect chemistry under ambient conditions. The proposed strategy introduces a new molecular design concept in which additive chemistry dynamically evolves during processing to mitigate the detrimental effects of air exposure. This work provides a promising pathway toward robust, high-quality air-processed perovskite films and establishes a versatile platform for developing next-generation reconfigurable additive systems for perovskite photovoltaics.

PS2-131

Multifunctional L-Cysteine Passivation for Efficient and Stable Deep-Blue Perovskite Light-Emitting Diodes

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Deep-blue perovskite light-emitting diodes (PeLEDs) are promising candidates for next-generation display technologies owing to their high color purity and tunable emission. However, their performance is often limited by abundant surface defects and non-radiative recombination associated with chloride-rich wide-bandgap perovskite compositions. Here, we demonstrate the effectiveness of L-cysteine as a multifunctional passivating agent for chloride-rich deep-blue perovskites. Owing to its multiple polar functional groups, including thiol (–SH), amino ($–NH_2$), and carboxyl (–COOH) moieties, L-cysteine forms multidentate interactions with undercoordinated Pb sites and surface defects. The synergistic coordination effectively suppresses non-radiative recombination, reduces trap-assisted carrier losses, and enhances the structural integrity of perovskite films. Furthermore, the multifunctional molecular framework regulates crystal growth and improves interfacial compatibility, leading to enhanced film morphology and more balanced charge injection. By systematically investigating the influence of L-cysteine on crystallization behavior, defect characteristics, photophysical properties, and electroluminescence performance, we establish a molecular passivation strategy based on naturally occurring amino acids. This work provides new insights into multifunctional molecular engineering and offers a versatile strategy for realizing efficient, spectrally stable, and high-performance deep-blue PeLEDs.

PS2-132

Positional Effects of Peripheral Spirofluorene Substitution in MR-TADF Emitters

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Thermally activated delayed fluorescence (TADF) materials, particularly multi-resonance (MR)-TADF emitters, have attracted considerable attention for deep-blue OLEDs owing to their narrow emission spectra.[1,2] However, efficiency roll-off caused by intermolecular interactions remains a major challenge. To investigate the positional effect of peripheral spirofluorene (SpFl) substitution, we designed and synthesized three boron/nitrogen-doped MR-TADF emitters, SA06-2, SA06-3, and SA06-4, sharing the same molecular framework but differing only in the position of the SpFl substituent. The bulky SpFl substituents were introduced as a molecular design strategy to reduce intermolecular interactions while maintaining the narrowband emission characteristics of MR-TADF emitters. Density functional theory (DFT) calculations revealed that the substitution position significantly influences the electronic properties. Among the three emitters, SA06-3 exhibited the highest oscillator strength (f = 0.2877), while all three molecules showed comparable singlet-triplet energy gaps of approximately 0.42 eV. The photophysical properties, optimized purification through recrystallization, and preliminary OLED device performance of these emitters are discussed.

[1] H. Uoyama, K. Goushi, K. Shizu, H. Nomura, C. Adachi, Nature 492, p.234–238 (2012).
[2] H. J. Kim, T. Yasuda, Adv. Opt. Mater, 2201714 (2022)

PS2-133

Preparation and Characterization of PVDF-based Copper(II) Chloride Hydroxides and Graphene Oxide Composites for Solar Cells

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The preparation and characterization of copper(II) chloride hydroxides and graphene-based PVDF nanomaterials were investigated to evaluate their potential application in solar cells. Copper(II) chloride hydroxides were synthesized via a controlled chemical precipitation method. The chemical, structural, and morphological properties of the synthesized materials were systematically analyzed using FT-IR spectroscopy, XRD, FE-SEM, and XPS. Furthermore, the integration of graphene oxide significantly enhanced the electrical conductivity and charge carrier mobility of the PVDF composite material, mitigating recombination losses. Photovoltaic performance evaluations demonstrated that the synergistic effect between the copper complex and the graphene oxide in the PVDF matrix led to a substantial improvement in power conversion efficiency. Ackowledgements: This work was supported by the Technology Innovation Program (RS-2026-25530941, Development of Graphene-Based Anti-Vibration Composite Materials and Component Technologies to Improve NVH Performance of Eco-Friendly Electric Vehicles) funded by the Ministry of Trade, Industry and Resources (MOTIR, Korea).

PS2-134

Donor Engineering of Blue MR-TADF Sensitizers for Blue OLED Devices

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Multi-resonance thermally activated delayed fluorescence (MR-TADF) materials, particularly 2,12-di-tert-butyl-5,9-bis(4-(tert-butyl)phenyl)-5,9-dihydro-5,9-diaza-13b-boranaphtho[3,2,1-de]anthracene (t-DABNA) derivatives, have emerged as promising sensitizers for next-generation hyperfluorescent OLEDs owing to their narrowband emission and efficient exciton-harvesting potential. However, the intrinsically planar geometry of MR cores often induces concentration-dependent quenching and limits spectral tunability, restricting their application in high-performance blue devices. In this work, we report a donor-engineering strategy in which donor moieties are introduced at the para-position relative to the boron center of the t-DABNA framework to modulate the optoelectronic properties of t-DABNA-based sensitizers. The strategic incorporation of sterically and electronically distinct donor moieties improved the reverse intersystem crossing (RISC) properties while providing steric protection to suppress non-radiative quenching pathways. This molecular design not only mitigates concentration-dependent losses but also optimizes the spectral overlap with the terminal emitter, facilitating efficient Förster resonance energy transfer (FRET). Consequently, the developed sensitizers can serve as effective exciton-harvesting platforms for hyperfluorescent OLEDs, enabling balanced control over emission color, exciton utilization, and molecular stability.

PS2-135

Surface Modification of Diatomite Using Silane Coupling Agents and Evaluation of Particle Interactions

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Surface modification of diatomite using silane coupling agents is an effective approach to control its interfacial properties for functional material applications. In this study, diatomite was surface-modified with silane coupling agents as a preliminary step toward the development of adsorbents for sidestream cigarette smoke. Surface modification was characterized by attenuated total reflection Fourier transform infrared (ATR-FTIR) spectroscopy, and particle interactions were evaluated by tensile testing using an artificial skin model. As shown in Fig. 1, the ATR-FTIR spectra of the silane-modified diatomite exhibited new alkyl C–H stretching bands in the 2800–3000 cm^{-1} region, indicating successful surface modification of the diatomite. Characteristic absorptions

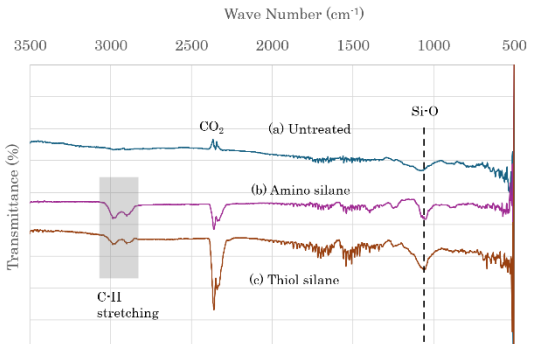

Fig. 1 ATR-FTIR spectra of untreated and silane-treated diatomite. The appearance of alkyl C–H stretching bands after silane treatment indicates

derived from the functional groups of the silane coupling agents were not clearly resolved because of overlap with hydroxyl-related bands and the limited sensitivity of ATR measurements. Tensile testing revealed differences in particle interactions among emulsions containing silane-modified diatomite, suggesting that surface modification influenced interparticle interactions. These findings provide a fundamental basis for the development of functional diatomite materials for sidestream cigarette smoke treatment.

Acknowledgement: This study was supported by Smoking Research Foundation.

PS2-136

Characteristics of n-Type BBL Field-Effect Transistors Made of Different Processing Conditions

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Polymer n-type semiconductors, particularly ladder polymers such as poly(benzimidazophenanthroline) (BBL), have attracted significant attention for organic electronics and complementary circuits. However, although BBL is a highly stable and rugged n-type polymer, the non-conventional processing conditions of BBL often limit its applications. In this work, we investigated how the processing conditions affect the electron-transport characteristics and the performance of n-channel organic field-effect transistors (OFETs). The optimized BBL transistors exhibit an electron mobility of up to 0.02 $cm^2 V^{-1} s^{-1}$ and an on/off current ratio exceeding 10^3, which represents a significant improvement compared to control devices. These results demonstrate an effective approach to improving charge transport in ladder-polymer semiconductors and provide practical design guidelines for high-performance n-type organic electronic devices.

PS2-137

Organic/Inorganic Hybridization of Conducting Polymer Composites through Post-Deposition Treatment with Sol-Gel Precursors

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In this work, we studied conducting polymer composites films based on a post-deposition treatment of poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) with a solution of silane precursors to modify the film properties. Infiltration, hydrolysis, and condensation of the precursors within the conducting polymer films resulted in the mechanically robust organic/inorganic hybrid composites which could be capable of transporting charge carriers and ions. We observed that the electrical properties of the composite films were dependent on the compositions and deposition conditions. We fabricated electrochemical devices as a platform to investigate the composite films by characterization of their cyclic voltammetry and electrochemical impedance spectroscopy. Higher levels of precursors led to an increase in overall impedance and a decrease in capacitance. This work demonstrates a simple solution-based hybridization of conducting polymer composite films can modulate the electrical, electrochemical, and mechanical properties of the films.

PS2-138

Poly(amic acid) Based Hydrogels with Ethylene Oxide Segments for Ion-Conducting Flexible Devices

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Hydrogels have attracted considerable attention as electrolyte materials for flexible electronic devices because of their transparency, stretchability, and biocompatibility. In this study, a poly(amic acid) based hydrogel was developed to improve both mechanical stability and ionic conductivity. A PAA containing ethylene oxide (EO) segments was synthesized from an EO-containing diamine and two dianhydrides (6FDA and ODPA). Hydrogel films with a three-dimensional network structure were then fabricated by crosslinking with isocyanate and an aromatic triamine. The prepared hydrogels were swollen with an electrolyte solution containing lithium bis(trifluoromethanesulfonyl)imide (Li-TFSI) and 1-ethyl-3-methylimidazolium bis(trifluoromethanesulfonyl)imide (EMIM-TFSI). The incorporated EO segments provided favorable pathways for ion transport, resulting in an ionic conductivity of 0.18 S/cm. The hydrogel also exhibited an elongation of approximately 195%, demonstrating its potential as an ion-conducting material for flexible electronic devices.

[1] C.-L. He, et al., Advanced Science, 8, 2102275 (2021).
[2] A.-N. Au-Duong, et al., Polymer Journal, 54, 305 (2022).

PS2-139

Intrinsic Chirality in a *p*-Type Polymer Enables Circularly Polarized Light-Sensing Artificial Synapses in Organic Electrochemical Transistors

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Artificial synapses are key building blocks of neuromorphic systems, integrating information processing and memory at the device level, and adding optical inputs extends their function toward visual information processing. Circularly polarized light (CPL) carries handedness as an extra information dimension, but exploiting it usually requires external optics. Here, we demonstrate CPL-sensing artificial synapses based on organic electrochemical transistors (OECTs) using a single p-type semiconducting polymer as the active layer. A chiral templating strategy imparts intrinsic chirality to the film, letting the channel itself discriminate left- and right-handed CPL without external optics. By performing morphological analysis and in-operando circular dichroism measurements, we reveal that the chiral structure is preserved under moderate doping but irreversibly collapses upon over-oxidation. Tracking the interplay between chiral structure and ion kinetics, we identify the operating conditions enabling stable CPL detection. Under left-/right-handed CPL, the devices generate polarization-dependent photocurrents driven by asymmetric light–matter interactions coupled to ion-driven doping. These translate into synaptic behaviors—paired-pulse facilitation, light-intensity- and gate-voltage-dependent potentiation, and persistent (memory) photocurrents—where identical stimuli of opposite handedness yield distinct postsynaptic currents. Polarization-encoded visual information can thus be sensed, processed, and stored within a single device, offering a route to neuromorphic visual systems with enhanced information density.

PS2-140

Broadening the Doping Process Window of Polymeric Hole-Transport Layers for Reliable Perovskite Solar Cells

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Perovskite solar cells (PSCs) have reached power conversion efficiencies (PCEs) exceeding 26% in laboratory-scale devices, but commercialization demands long-term operational durability and reproducible large-area fabrication. In polymeric hole-transport layers (HTLs), doping is required for high conductivity and efficient hole extraction; however, conventional poly[bis(4-phenyl)(2,4,6-trimethylphenyl)amine] (PTAA) exhibits a narrow doping process window because its nonplanar triarylamine backbone induces localized doping-generated polarons. This localization causes electronic-structure variation, dopant-concentration-dependent charge transport, and interfacial charge accumulation. Moreover, nonuniform dopant distribution during large-area coating can produce under- or over-doped regions, leading to performance variation and faster degradation. Here, we present PDVB14, a PTAA-based random copolymer containing planar divinylbenzene (DVB) units, as a doping-tolerant polymeric HTL. DVB incorporation improves local backbone planarity, facilitates polaron delocalization, and reduces Fermi-level shifts under heavy doping. Molecular interactions between DVB units and LiTFSI promote uniform dopant distribution while maintaining favorable π–π interactions. PSCs employing PDVB14 achieved PCEs of 23.5% in small-area devices and 20.6% in 1.0 cm² devices, with enhanced thermal, light, humidity, and maximum power point operational stability. This work presents a molecular design strategy for stable and scalable PSCs by broadening the HTL doping process window.

[1] Kim, C.; Ryu, S. U.; Ryu, D. H.; et al. Rational Backbone Planarization for Doping-Resilient Polymeric Hole Transport Materials Toward Stable and Scalable Perovskite Solar Cells. *Adv. Energy Mater.* **2026**, e06762.

PS2-141

Phosphorylcholine-Modified Nickel Oxide Enables Reconfigurable Perovskite Crystallization for Efficient Pure-Blue Perovskite Light-Emitting Diodes

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Pure-blue perovskite light-emitting diodes (PeLEDs) have emerged as promising candidates for next-generation display technologies but continue to suffer from inefficient hole injection and severe interfacial non-radiative recombination arising from the nickel oxide (NiOx)/perovskite interface. Here, we present a phosphorylcholine-based interfacial engineering strategy to reconstruct the surface properties of NiOx for high-performance pure-blue PeLEDs. The phosphate moiety of phosphorylcholine is designed to establish multidentate coordination with the NiOx surface, forming a robust interfacial layer while simultaneously modulating the surface dipole and work function. The reconstructed NiOx surface is expected to control perovskite crystallization by tailoring surface energy and nucleation kinetics, leading to enlarged grains, improved film uniformity, and reduced interfacial defect density. In addition, the optimized interfacial energetics facilitate hole injection and suppress

interfacial non-radiative recombination, thereby promoting efficient radiative recombination in pure-blue perovskites. By systematically investigating the effects of phosphorylcholine modification on NiOx surface chemistry, perovskite crystallization, interfacial electronic structure, and electroluminescence characteristics, we establishes an interface-directed molecular engineering strategy for simultaneously controlling crystal growth and charge injection. The proposed approach provides new insights into reconfigurable crystallization through metal oxide surface engineering and offers a versatile platform for realizing efficient, spectrally stable, and high-performance pure-blue PeLEDs.

PS2-142

Benzylphosphonic acid reconstructs the buried ITO/NiOx interface and the NiOx/perovskite interface simultaneously

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Pure-blue perovskite light-emitting diodes (PeLEDs) require efficient hole injection and defect-minimized buried interfaces to simultaneously achieve high efficiency and spectral stability. However, the intrinsic structural and electronic mismatch between rigid metal oxides and soft ionic perovskites often results in inefficient charge transfer, interfacial non-radiative recombination, and uncontrolled crystal growth. Here, we introduce benzylphosphonic acid (BPA) as a molecular bridge for dual-interface engineering in pure-blue PeLEDs. The phosphonic acid moiety forms robust multidentate coordination with the NiOx surface, reconstructing the buried oxide interface and modulating its surface energetics. Meanwhile, the flexible benzyl group provides a molecularly compliant interface that tailors surface energy and nucleation kinetics, enabling reconfigurable perovskite crystallization with enhanced grain uniformity and reduced interfacial defect density. The BPA-mediated interfacial reconstruction is further expected to improve energy-level alignment, facilitate hole injection, and suppress interfacial non-radiative recombination. By systematically investigating the influence of BPA on oxide surface chemistry, interfacial electronic structure, perovskite crystallization, and electroluminescence characteristics, this work establishes a molecular bridging strategy that simultaneously optimizes charge injection and crystal formation. The proposed approach provides a versatile platform for interface-directed molecular engineering toward efficient, spectrally stable, and high-performance pure-blue PeLEDs.

PS2-143

Performance enhancement of perovskite light-emitting diodes via ultraviolet–ozone oxidative treatment of polymeric hole transport layers and its mechanism investigation

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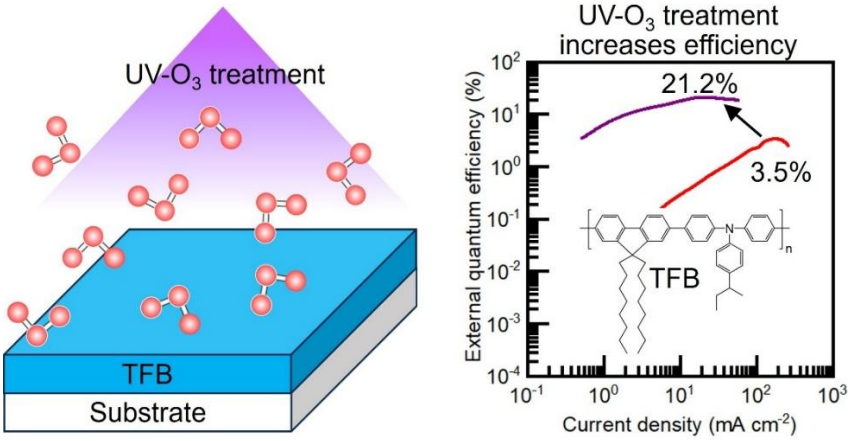
Perovskite light-emitting diodes commonly employ the polymeric hole transport material poly[9,9-dioctylfluorene-co-*N*-[4-(3-methylpropyl)]-diphenylamine] (TFB) because of its suitable energy-level alignment and excellent solution processability. However, exciton quenching at the interface between the perovskite emitting layer and the polymeric hole transport layer remains a major factor limiting device efficiency. In this study, it is demonstrated that an ultraviolet–ozone surface treatment of TFB effectively suppresses exciton quenching, leading to substantial improvements in the performance of perovskite light-emitting diodes. Devices incorporating the ultraviolet–ozone-treated polymeric hole transport layer exhibit an external quantum efficiency of 21.2%, compared with 3.5% for untreated devices, and an operational half-lifetime at 100 cd m^{-2} that increases from 33 to 126 minutes. Combined spectroscopic and electrical analyses reveal that ultraviolet–ozone treatment induces surface oxidation of the polymeric hole transport layer, forming an oxidized interfacial region with a widened energy gap that suppresses hole transfer from the perovskite emitting layer and thereby significantly reduces exciton quenching. This mechanism differs from previously proposed explanations based on enhanced wettability or improved perovskite film morphology, revealing a previously unrecognized role of oxidized polymeric interfaces in determining device performance. These findings provide a simple, scalable, and effective interfacial engineering strategy for simultaneously improving the efficiency, operational stability, and long-term durability of perovskite-based optoelectronic devices.



[1] Reiko Yamauchi, Zhanglin Guo, and Toshinori Matsushima*, Performance enhancement of perovskite light-emitting diodes via ultraviolet–ozone oxidative treatment of polymeric hole transport layers and its mechanism investigation, Chemical Engineering Journal, Volume 524, Issue, Page 169156, Year 2025

PS2-144

Concentration-Tunable White-Light Emission and Maskless Photopatterning of Azide-Crosslinked Donor–Acceptor Conjugated Polymers

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Conjugated polymers are promising emissive materials for displays and optical devices because of their solution processability and mechanical flexibility. Their emission can be tuned not only by molecular design but also by concentration-dependent intermolecular interactions.

In this study, a donor–acceptor conjugated copolymer was synthesized and its photoluminescence behavior was investigated as a function of solution concentration. At low concentration, short-wavelength emission was dominant, whereas increasing concentration enhanced long-wavelength emission through stronger intermolecular interactions and energy transfer. CIE color-coordinate analysis confirmed a continuous shift in emission color, and visible white-light emission was obtained at a specific concentration where the two emission bands were balanced. To retain this behavior in the solid state, a transparent polymer matrix and an azide-based crosslinker were introduced. After 254 nm UV irradiation, FT-IR analysis showed a decrease in the azide band, confirming crosslink formation. The resulting crosslinked matrix suppressed polymer dissolution and spatially fixed the emissive regions. Based on these results, selective UV exposure using a maskless photopatterning machine was employed to spatially define the emissive regions and fabricate photopatterns exhibiting visible white-light emission. This work demonstrates a simple strategy for concentration-tunable multicolor and white-light emission in photopatternable conjugated polymer-based light emitting systems.

PS2-145

Photovoltage-Gated Transfer Modulation in a Solution-Gated Organic Phototransistor Using a Plasmonic OSC

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An optically driven solution-gated organic phototransistor (SGOPT) was prepared using a plasmonic organic solar cell (OSC) gate coupled to a P3HT/graphene-oxide FET through phosphate-buffered saline (PBS).[1,2] The device architecture is summarized in Fig. 1. In this configuration, the voltage generated in the OSC is used as an optical gate input, while the poly(3-hexylthiophene-2,5-diyl) (P3HT)/graphene oxide (GO) channel also contributes direct photoconductance.[3] The OSC has a grating structure at the interface between the organic layer and the Al electrode enabling an excitation of propagating SPR. We investigated the performance of the SGOPT and the contribution of the SPR effect in the OSC.
Figure 2 illustrates the open-circuit voltages (V_{OC}s) observed in the plasmonic OSC when exposed to monochromatic light (λ = 620 nm). The V_{OC}s generated by the OSC varied with the intensity of the light. Notably, higher V_{OC}s were observed with p-polarized light, which induces SPR. This effect can be attributed to the enhancement of light absorption in the organic film in the OSC as the result of SPR.
The measurement protocol for EGOPT is summarized in Table 1. The performance of the EGOPT was evaluated both in the absence and presence of the OSC. Additionally, various illumination conditions were applied to the OSC and OFET. Transfer curves obtained from the measurements M3 and M4 under monochromatic light irradiation (λ = 620 nm) are presented in Fig. 3. Illumination solely on the OFET (M3) resulted in a weak response. Conversely, simultaneous illumination on both the OSC and OFET (M4) produced significant responses. Moreover, p-polarized light illumination resulted in a substantial current enhancement, indicating the presence of the SPR effect.[4]

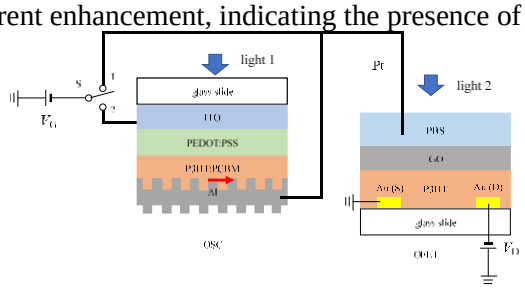

Fig. 1. SGOPT concept using a plasmonic OSC gate.

Table 1. Measurement method.

Measurement	Switch	Illumination
M1	1	OFET only
M2	2	OSC only
M3	2	OFET only
M4	2	OFET and OSC
M5	1	OFET only

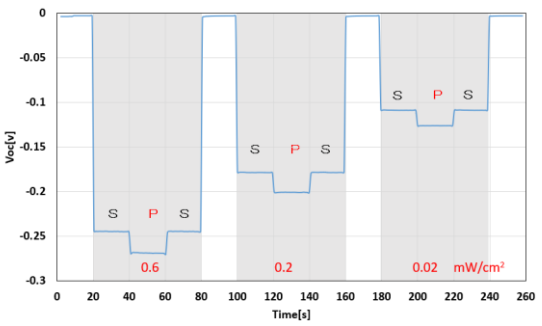

Fig. 2. Power- and polarization-resolved V_{OC} transients (λ = 620 nm, at 0.6, 0.2, and 0.02 mW cm^{-2}).

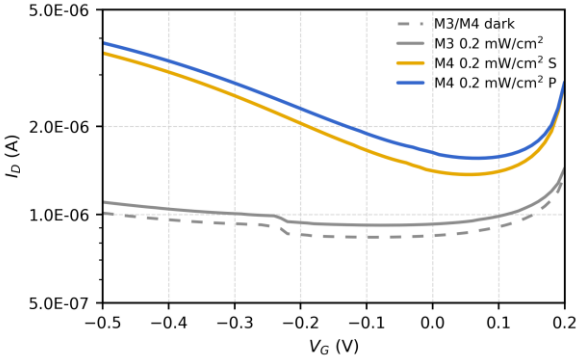

Fig. 3. Transfer curves for Methods 3 and 4 (λ = 620 nm).

[1] J. Rivnay et al., Nat. Rev. Mater. 3, 17086 (2018).
[2] J. Song et al., Adv. Mater. 35, 2207763 (2023).
[3] L. J. A. Koster et al., Appl. Phys. Lett. 86, 123509 (2005).
[4] K. Hara et al., Phys. Chem. Chem. Phys. 19, 2791 (2017).

PS2-146

Aggregation Structure Control of Rod-like Luminescent Gold(I) Complexes Bearing Oligoethylene Oxide Chains

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In recent years, aggregation-induced emission (AIE), in which luminescence is enhanced in the aggregated state, has attracted considerable attention. Among AIE-active materials, gold(I) complexes exhibit unique luminescence originating from aurophilic interactions, and their emission properties are strongly influenced by the aggregation structure. Therefore, controlling molecular aggregation is an effective strategy for tuning their luminescence behavior. Indeed, previous studies[1] have reported that rod-like gold complexes bearing isocyanide ligands exhibit changes in their emission color accompanied by phase transitions. This phenomenon indicates that changes in aggregation structure induced by phase transitions can significantly affect the luminescence properties.

In this study, oligoethylene oxide (OEO) chains were introduced into rod-like isocyanide-based gold(I) complexes to regulate their aggregation structures. The photophysical properties and aggregation behavior of the resulting complexes were systematically investigated. The introduction of OEO chains altered the aggregation structures and induced changes in the luminescence behavior, demonstrating the potential of OEO-based molecular design for controlling the optical properties of luminescent gold(I) complexes.

[1] Fujisawa, K. *et al*. *J. Mater. Chem. C*, **2**, 3549 (2014).

PS2-147

Fabrication of durable nanopillars surface on stainless steel using plasma etching and nitriding process

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Fabricating nanopillars on material surfaces can impart various functionalities such as antireflection, light trapping, and superhydrophobicity. We also previously demonstrated that Ar plasma etching using direct current (DC) discharge can form antibacterial nanopillars on AISI 316 stainless steel (316SS) surfaces [1]. However, these nanostructures are readily deformed by slight abrasion, resulting in deterioration of their performance. To enhance their mechanical durability, this study investigates plasma nitriding as a post-treatment for strengthening the nanopillar structures.

Nanopillars were fabricated on 316SS substrates by Ar plasma DC-discharged at constant currents ranging from 0.05 to 0.15 A for 60 min using a laboratory-built apparatus. The etched surfaces were subsequently plasma nitrided in an N_2–H_2 gas mixture.

The height and diameter of the nanopillars increased with increasing discharge current. Plasma nitriding converted the nanopillars into expanded austenite phase through nitrogen diffusion, improving their resistance to abrasion-induced deformation. Furthermore, the nitrided nanopillar surface exhibited antibacterial activity against *Staphylococcus epidermidis* even after abrasion. These results suggest that post-plasma nitriding is an effective strategy for fabricating mechanically durable nanopillar surfaces preserving their activity after abrasion.

[1] M. Hirano et al., *Surface and Coatings Technology*, **406**, 126680 (2021).

PS2-148

Raman Mapping Using Ag Cluster-Decorated Polystyrene Particles as Localized SERS Probes

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Silver cluster-decorated polystyrene (PS) particles have been investigated as SERS-active probes for Raman signal enhancement. In this study, their applicability to Raman mapping was evaluated. As shown in Fig. 1(a), Rhodamine 6G (R6G) was deposited on a glass slide, followed by the placement of aggregated Ag cluster-decorated PS particles. Raman mapping revealed localized signal enhancement around the particle aggregates (Fig. 1(b)). A representative Raman spectrum obtained from the highlighted region is shown in Fig. 1(c). Although the observed spectra could not be unequivocally assigned to R6G because of SERS-induced peak shifts and Raman scattering from the PS particles, increased Raman signal intensity was observed near the aggregates. These results indicate that Ag cluster-decorated PS particle aggregates can function as localized SERS probes for Raman mapping and imaging applications.

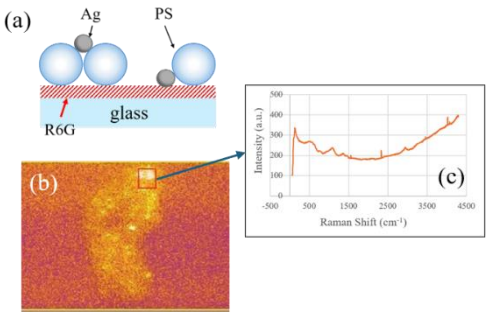

Fig. 1. Experimental overview of Raman mapping using Ag cluster-decorated PS particles: (a) sample configuration, (b) Raman mapping image, and (c) representative Raman spectrum acquired from the highlighted region.

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PS2-149

Development of sol-gel transition composite materials controlled by infrared irradiation

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The aim of this study is to control the sol-gel transition of hydrogel composite using infra-red irradiation, we are forced on thermal property of carbon nanotubes derivatives (CNTs). CNTs are known to infra-red sensitive, then are generated heat by the irradiation effectively [1]. Thus, we investigated in sol-gel transition of the hydrogels contained CNTs under infra-red irradiation. We investigated to develop controlled drug release materials based on sol-gel transition. On view point of resistant bacteria, it is required to control the dose and timing of some drugs. For controlled drug-release properties of required amount and required timing, it is required to develop an intelligent DDS material, which can be controlled drug release behavior.

[1] T. Takada. *Tanso*, **295**, 135 (2020).