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Journal of Materials Chemistry C

Materials for optical, magnetic and electronic devices

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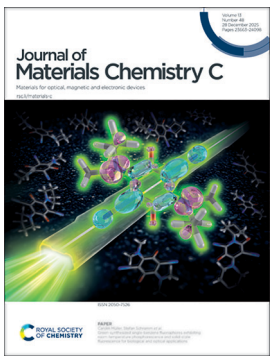
IN THIS ISSUE

ISSN 2050–7526 CODEN JMCCCX 13(48) 23663–24098 (2025)



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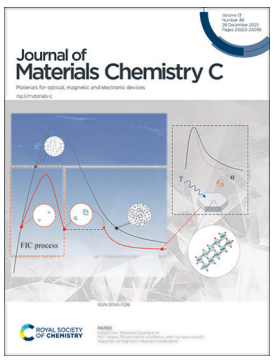


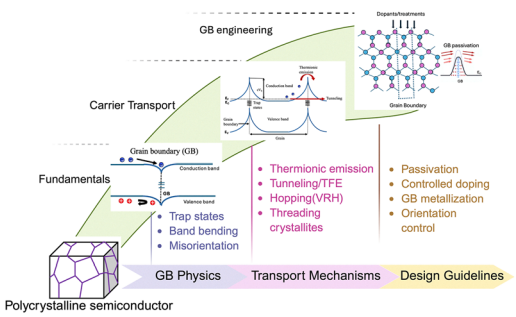
Inside cover
See Liang Chen, Xiaoping Ouyang *et al.*, pp. 23784–23795. Image reproduced by permission of Xinglong Shang from *J. Mater. Chem. C*, 2025, **13**, 23784.

REVIEWS

23675

Carrier transport mechanisms in polycrystalline semiconductors: from grain boundary physics to device performance

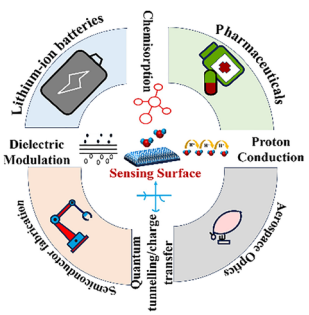
Israt Jahan, Jesus Dustin Arellano and Zhisheng Shi*



23696

Design principles for ultra-low humidity sensors: a mechanism-oriented review

Noor Alam and Yonggao Yin*



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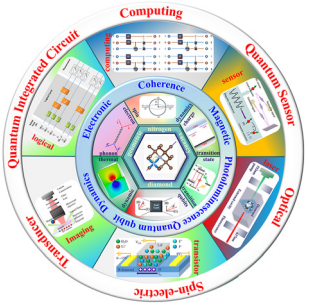
REVIEWS

23714

Multiscale engineering of diamond nitrogen-vacancy centres: from atomic defect dynamics to functional quantum devices

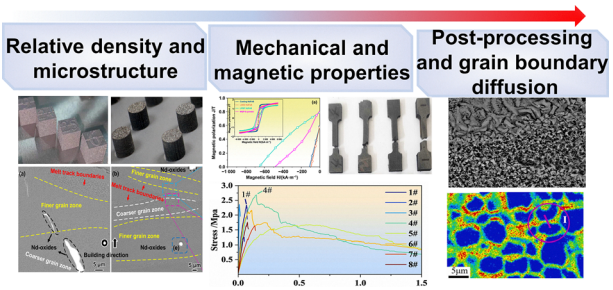
Ming-Hui Shang, Yong Xu,* Zhao Liang, Xiangdong Yang, Jinju Zheng and Weiyou Yang*



23731

Interplay of the laser energy density and microstructure on the properties of NdFeB manufactured by laser powder bed fusion: a review

Hao Dong, Guoxuan Ming, Ketai He,* Xiaowei Meng, Yangwei Du and Chaofang Dong



COMMUNICATION

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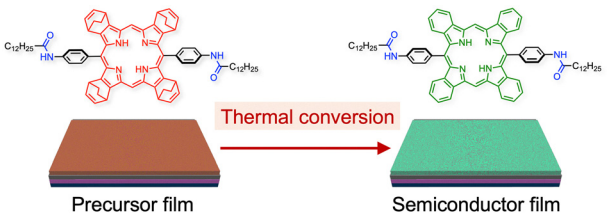
Fabrication of tetrabenzoporphyrin thin-film transistors with hydrogen-bonding networks *via* a thermal precursor approach and effect of the amide-group position

So Ueno, Mitsuaki Yamauchi,* Hiroshi Matsuda, Nobutaka Shioya, Keitaro Yamamoto, Yoshiyuki Mizuhata, Takeshi Hasegawa and Hiroko Yamada*



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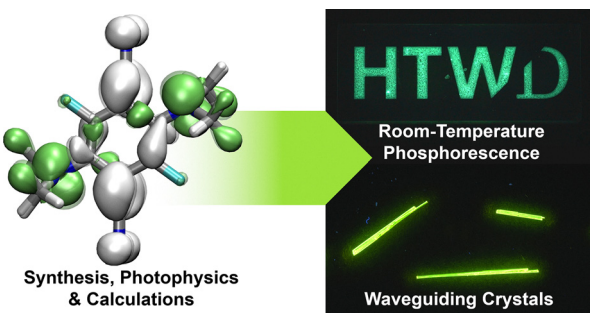
Green-synthesized single-benzene fluorophores exhibiting room-temperature phosphorescence and solid-state fluorescence for biological and optical applications

Maximilian Kramp, Durga Prasad Karothu, Juan Camilo Zschommler, Patrick Commins, Thomas Prestel, Verena Ibl, Panče Naumov, Carolin Müller* and Stefan Schramm*



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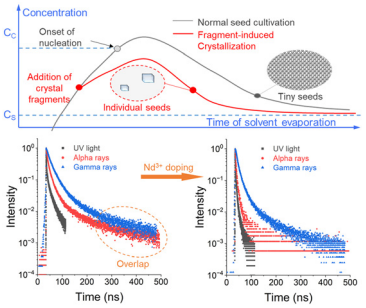
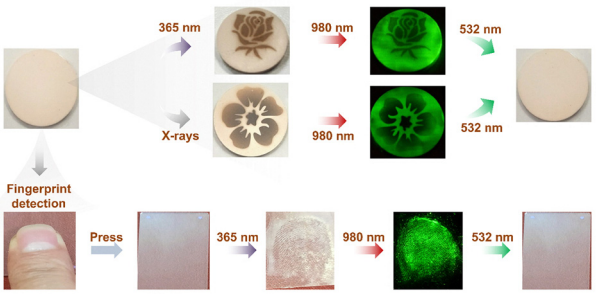


Nd^{3+}-doped 2D perovskite scintillators with ray-type-specific response *via* fragment-induced crystallization

Xinlong Shang, Yang Li, Liang Chen,* Quan Zhang, Leidang Zhou, Naizhe Zhao, Jinlu Ruan, Shiyi He, Fangbao Wang, Yapeng Zhang and Xiaoping Ouyang*

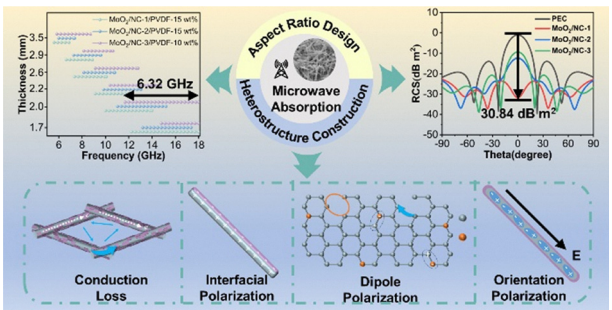
23796



Multifunctional $Bi_2TeO_5:Er^{3+}$ with dual-stimuli photochromism and switchable upconversion for optical security

Asad Ullah, Asif Ali Haider, Jiayan Liao,* Xue Bai, Anjun Huang, Imran Khan, Yangke Cun, Yuewei Li, Yingfan Li, Zhiguo Song, Jianbei Qiu and Zhengwen Yang*

23807



Aspect ratio design and heterostructure construction of MoO_2/NC nanorods for broadband microwave absorption

Yidan He, Yunliang Dai, Yuke Zheng and Xiaojuan Zhang*

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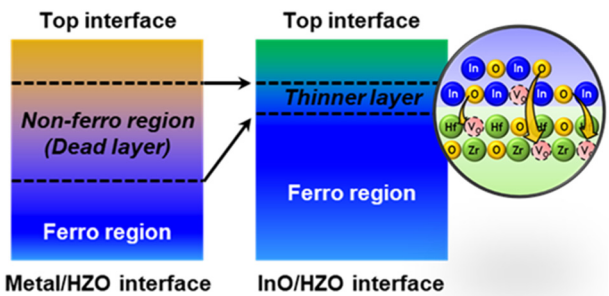

An ultra-thin InO interlayer as an oxygen reservoir for defect passivation and enhanced ferroelectricity in hafnia devices

Junghyeon Hwang, Chaeheon Kim, Jinho Ahn* and Sanghun Jeon*

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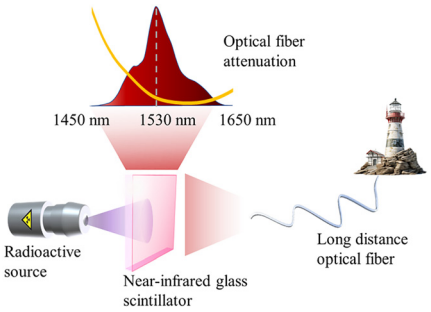
PAPERS

23831

Assessment of rare earth ion-doped near-infrared glass scintillators

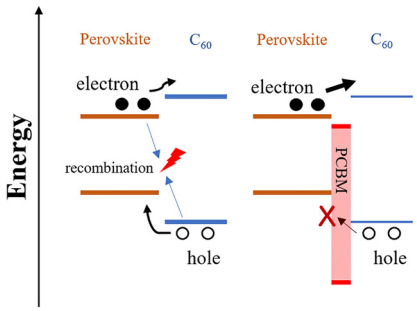
Zexuan Sui, Jinling Ma, Jiaxuan Ye,* Minghui Kang, Xiaoxin Zheng, Sen Qian, Bing Wang, Yiran Zhao and Jing Ren*



23840

Tin–lead perovskite solar cells featuring buffer layer structures: a combined theoretical and experimental study

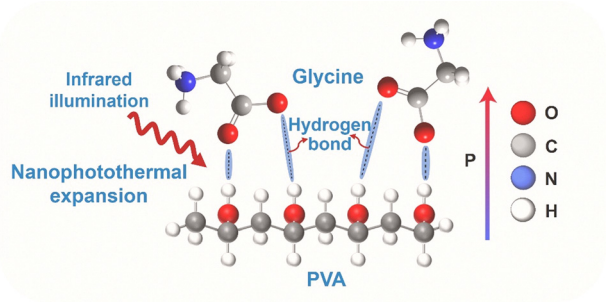
Zichao Xu, Ao Chen, Mengqi Ren, Shaopeng Liao, Menghao Xu, Chen Tao, Haibing Wang, Chen Wang, Fang Yao, Xiaojuan Cao, Jiwei Liang, MingMing Hu, Yansong Ge, Jian Wen, Xuzhi Hu* and Guojia Fang*



23849

Infrared photothermal enhancement of piezoelectricity in γ-glycine/PVA films *via* targeted interfacial hydrogen bond engineering

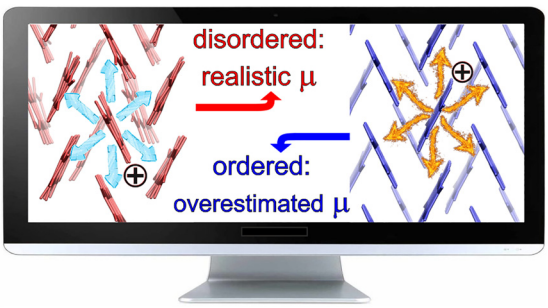
Lei Wang, Kaimin Du, Wentong Du, Kunyu Zhao and Huarong Zeng*



23855

Effect of thermal disorder on the electronic structure and the charge mobility of acenes

Alessandro Landi,* Francesco Ambrosio,* Anna Leo, Daniele Padula, Giacomo Prampolini and Andrea Peluso*



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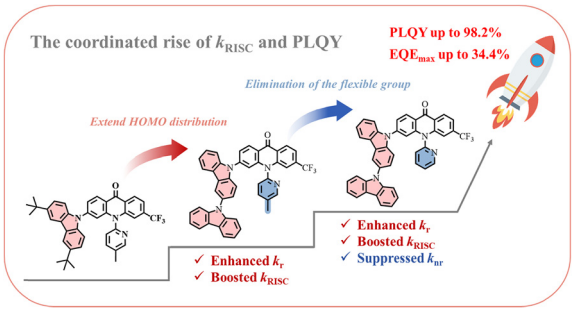
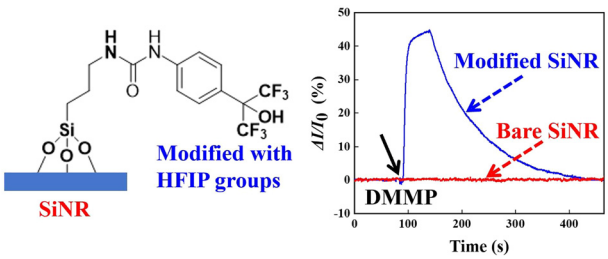


Boosting EQE to nearly 35% in acridone-based TADF materials *via* HOMO delocalization and nonradiation suppression

Jingjie Yang, Jing Jin, Jiuyan Li,* Jiahui Wang, Hongyu Chen, Meiling Mao, Yongqiang Mei* and Di Liu*

23881



Novel molecule design for surface modification enables highly selective DMMP detection with silicon nanoribbon FET sensors

Runsheng Zang, Jun Shen, Jiahao Qin, Haizhen Li, Yongchao Zheng,* Yuan Cheng, Xiujuan Zhang* and Bingchang Zhang*

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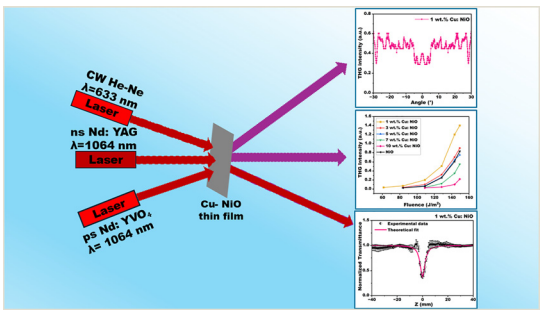

Tuning the excitation-regime-dependent nonlinear optical responses of Cu-doped NiO thin films for harmonic generation and ultrafast photonic applications

Ramseena Thundiyil, P. Poornesh,* Katarzyna Ozga, Jaroslaw Jedryka, Dominique Guichaoua, Said Taboukhat, Saikat Chattopadhyay and Bouchta Sahraoui

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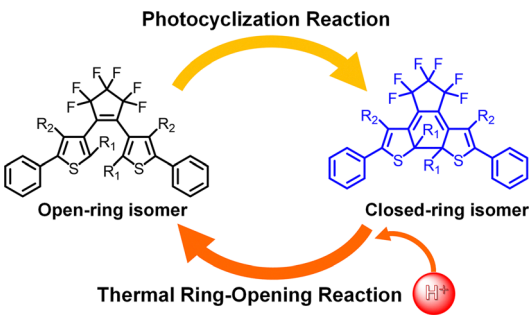

Acid-assisted thermal ring-opening reaction of photochromic diarylethene closed-ring isomers

Seiya Kobatake,* Daichi Kitagawa, Ryosuke Kubo, Momoka Sakurai and Hiroyuki Maemichi

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PAPERS

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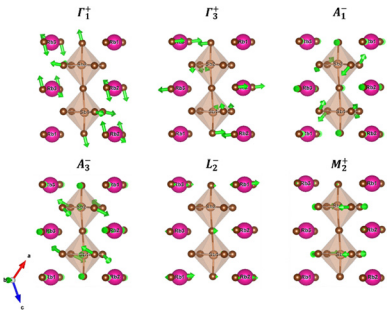
Structure–property coupling in lead-free halides $Rb_3Sb_2Br_9$ and $Rb_3Sb_2Br_6I_3$ obtained by mechanochemistry

Yousra Chakroun, Wajdi Cherif, Brenda Martinelli, Carlos A. López, Javier Gainza, Romualdo S. Silva Jr., Federico Serrano-Sánchez, Mateus M. Ferrer, C. Pecharromán, João Elias F. S. Rodrigues* and José A. Alonso*



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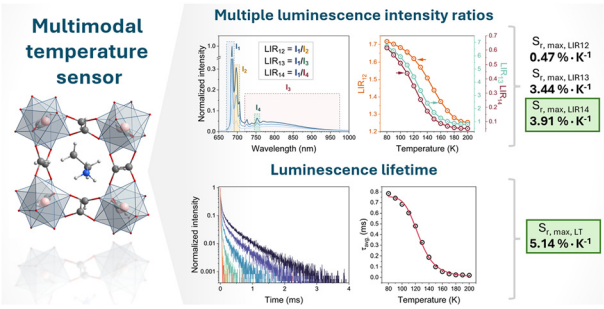
Multimodal temperature sensing in hybrid perovskites doped with Cr^{3+}: a strategy for optimizing luminescent thermometers

Adam Kabański,* Kacper Caputa and Dagmara Stefańska*



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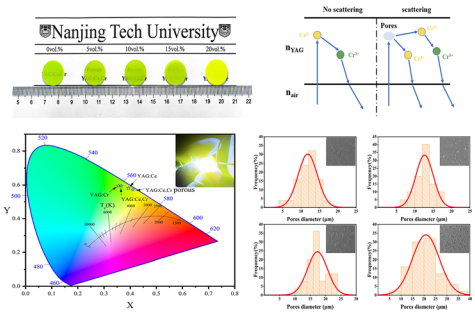
Non-spherical pore scattering-enhanced YAG:Ce^{3+}, Cr^{3+} ceramics: efficient light converters for high-brightness laser illumination

Ningtong Yang, Yulong Ji, Haikui Zhu,* Yigang Qian and Lixi Wang*



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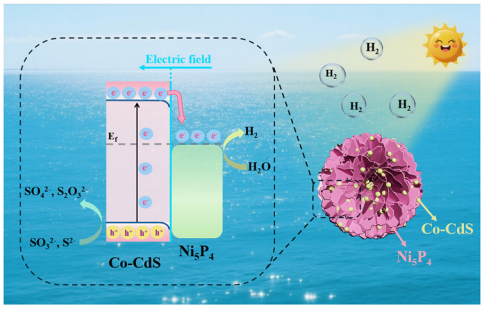
Enhancing photocatalytic hydrogen evolution of metal sulfides *via* a Co-CdS/Ni_5P_4 ohmic junction

Mengru Bao, Zhenyu An, Jiao Zhang, Yongxin Chen, Xin Guo, Xueying Yang* and Zhiliang Jin



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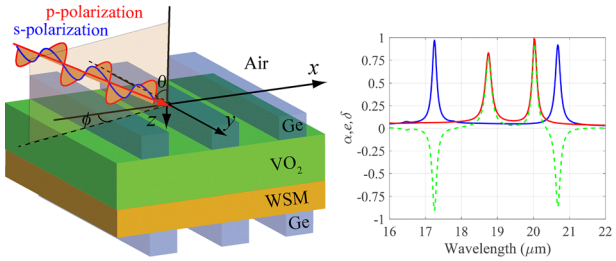
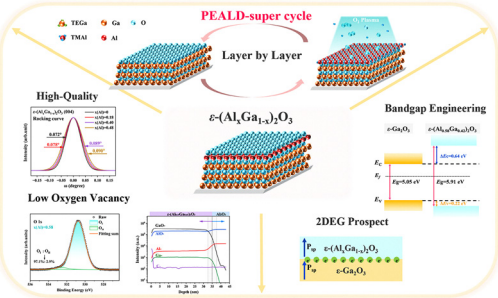


Magnet-free nonreciprocal thermal emitters *via* VO_2–Weyl semimetal double-sided grating metasurfaces

Qi Fang, Wenyang Ma, Fenglin Xian and Gaige Zheng*

23979



Plasma-enhanced ALD growth of ε-$(Al_xGa_{1-x})_2O_3$ alloy films with high Al content and tunable band offsets

Jinteng Zhang, Xiaohong Zeng, Liang Yu, Shuhao Zhang, Quan Miao, Zicheng Xing, Zhiyun Li, Nan Hu, Rong Huang, Yang Shen, Yecheng Ding, Zhitai Jia,* Ying Wu* and Sunan Ding*

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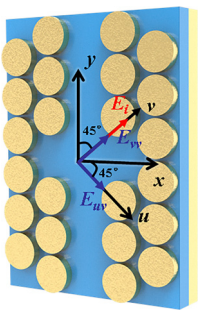

Improving the performance of polarization conversion in the near-infrared with low insertion loss by the metasurface

Qi Chen, Si-Yuan Liao, Jun-Jie Luo, Jia-Hao Zou and Hai-Feng Zhang*

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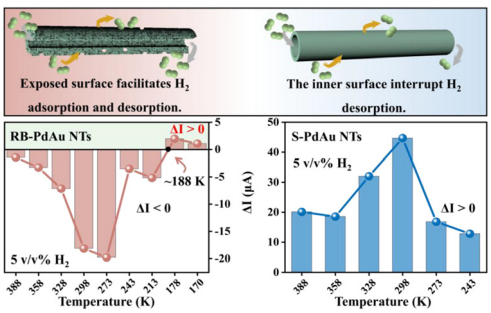

Palladium and gold nanotube arrays with tuned surfaces for low-temperature hydrogen sensing

Zhenxu Li, Xinhua Zhao, Yi Zhang, Zhu Zhang, Tingting Wang and Dachi Yang*

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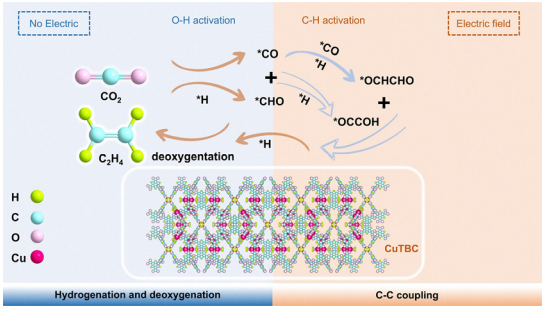
PAPERS

24007

Enhancing C_2 production in CO_2 electroreduction using hierarchical copper–organic links: a molecular engineering approach for advanced metal–organic framework catalysts

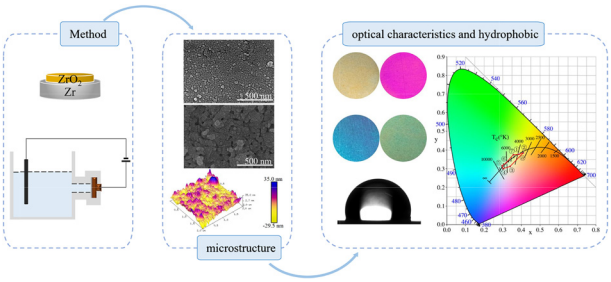
Yaoqi Wei, Ziwei Lu, Yucui Wei, Fengyun Zhang, Ying Chen, Wenting Qiu, Zhentian Xu,* Huanhuan Zhang* and Xiangfei Liang*



24014

Preparation, color formation mechanisms and hydrophobic properties of anodic zirconia films

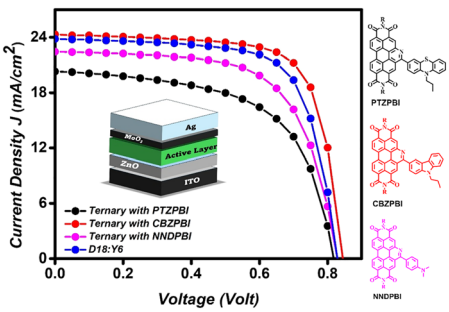
Panzhe Hou, Lingna Jia, Tianen Liu, Guangyu Wen, Junmeng Zhang, Lihu Liu, Peipei Lu* and Huiyuan Sun*



24024

Donor-functionalized aza-benzannulated perylenediimide-based ternary blend efficient inverted organic solar cells

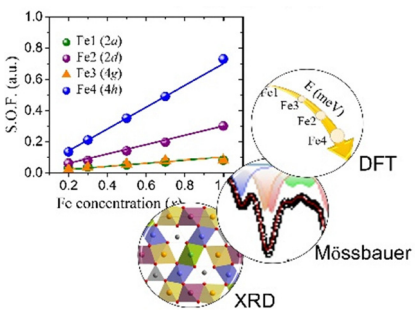
Mohd Wazid, Tarun, Upendra Kumar Pandey* and Rajneesh Misra*



24036

Insight into the cation distribution in $Co_2Co_{1-x}Fe_x(BO_3)O_2$ ($0.0 < x < 1.0$): X-ray diffraction, Mössbauer spectroscopy, and DFT investigations

Yu. S. Gokhfeld, N. V. Kazak, V. S. Zhandun,* A. D. Vasiliev, Yu. V. Knyazev, D. A. Velikanov, S. Yu. Gavrilkin, O. A. Kondratev, A. O. Belyaeva, L. N. Bezmaternykh and S. G. Ovchinnikov



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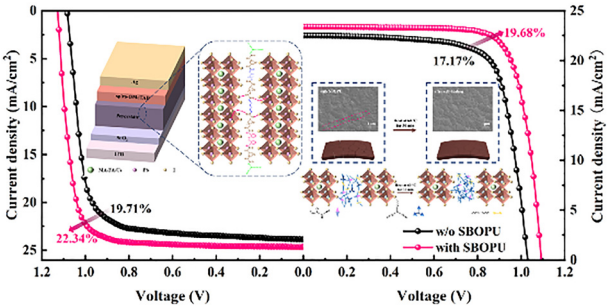
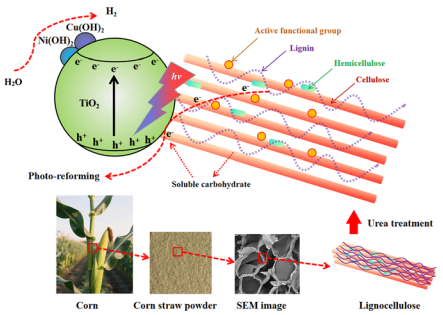
24056



Synergistic dynamic bonds in self-repairing elastomers boost efficiency and bendability of flexible perovskite photovoltaics

Xueying Li, Lixin Song,* Ruizhi Duan, Nan Liu, Xinyi Zheng, Pingfan Du and Jie Xiong

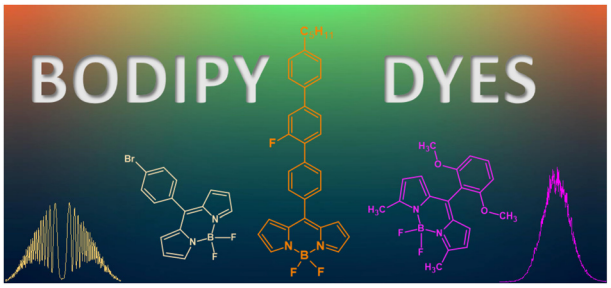
24067



A low-cost strategy for photocatalytic hydrogen production by using non-noble metal catalysts and biomass as a sacrificial agent

Dongyao Lin* and Peijie Wang

24079



Versatile BODIPY dyes for advanced optoelectronics: random lasing, harmonics generation, and OLED application

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