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Materials Horizons

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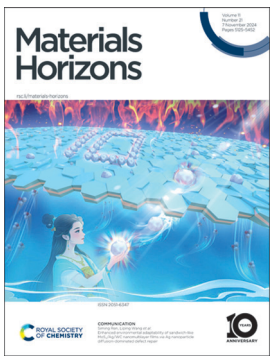
Cover
See Jaejun Lee, Tae Ann Kim *et al.*, pp. 5220–5229. Image reproduced by permission of Tae Ann Kim from *Mater. Horiz.*, 2024, **11**, 5220.



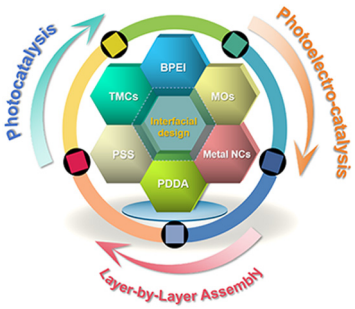
Inside cover
See Siming Ren, Liping Wang *et al.*, pp. 5230–5243. Image reproduced by permission of Liping Wang from *Mater. Horiz.*, 2024, **11**, 5230.

COMMENT

5136

A reflection on 'Self-assembly of aligned rutile@anatase TiO_2 nanorod@CdS quantum dots ternary core–shell heterostructure: cascade electron transfer by interfacial design'

Xian Yan, Jiao-Nan Yuan, Fang-Xing Xiao* and Bin Liu*

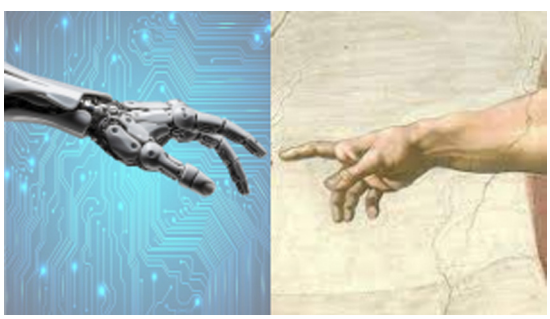


OPINION

5141

Reaching across the divide: materials scientists interfacing with biologists

Rachana Acharya and Róisín M. Owens*



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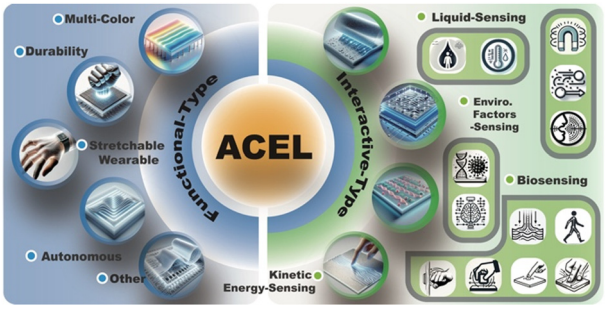
REVIEWS

5147

Alternating current electroluminescence devices: recent advances and functional applications

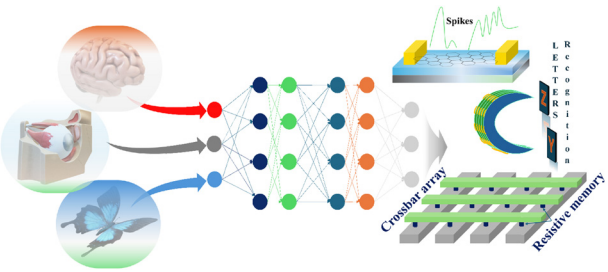
Yibin Liu, Meili Xu,* Hui Long, Roman B. Vasiliev, Shukui Li, Hong Meng and Shuai Chang*



5181

An evaluation of recent advancements in biological sensory organ-inspired neuromorphically tuned biomimetic devices

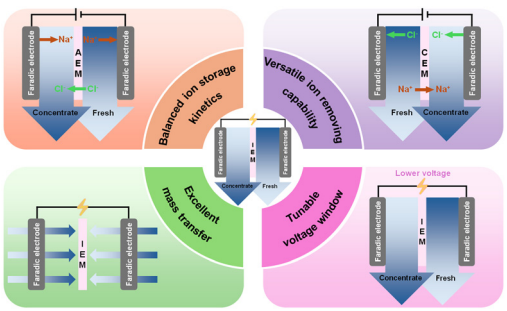
Animesh Sinha, Jihun Lee, Junho Kim and Hongyun So*



5209

Tailoring the electrode material and structure of rocking-chair capacitive deionization for high-performance desalination

Hao Wang, Yong Liu,* Yuquan Li, Xingtao Xu,* Ting Lu and Likun Pan*

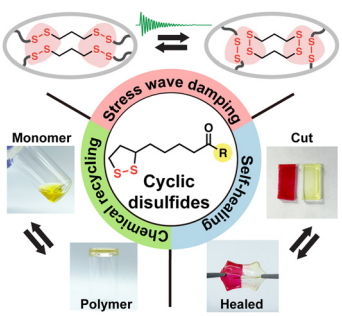


COMMUNICATIONS

5220

Principles for designing sustainable and high-strain rate stress wave dissipating materials

Juho Lee, Gyeongmin Park, Dongju Lee, Jiyun Shin, Cheol-Hee Ahn, Jaejun Lee* and Tae Ann Kim*



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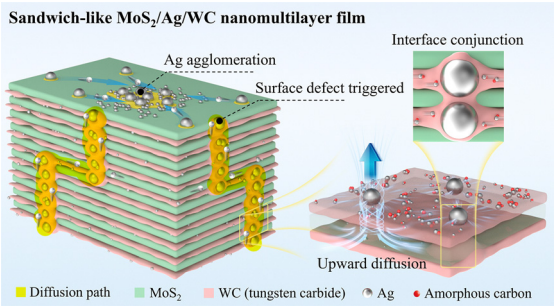
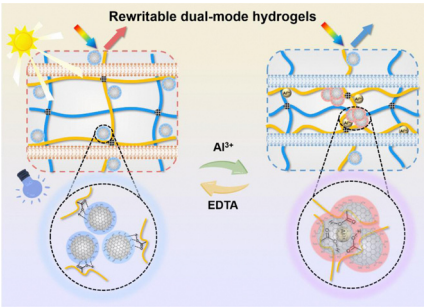
5230



Enhanced environmental adaptability of sandwich-like MoS_2/Ag/WC nanomultilayer films *via* Ag nanoparticle diffusion-dominated defect repair

Min Yang, Xin Fan, Siming Ren* and Liping Wang*

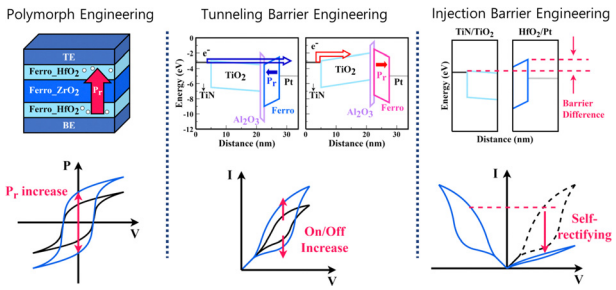
5244



Dynamic metal–ligand coordination enables a hydrogel with rewritable dual-mode pattern display

Hui Shang, Yu Sun, Xiaoxia Le,* Ying Shen and Tao Chen*

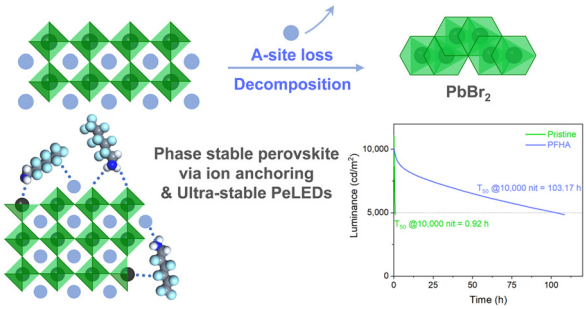
5251



A fluorite-structured $HfO_2/ZrO_2/HfO_2$ superlattice based self-rectifying ferroelectric tunnel junction synapse

Dong Hyun Lee, Ji Eun Kim, Yong Hyeon Cho, Sojin Kim, Geun Hyeong Park, Hyojun Choi, Sun Young Lee, Taegyu Kwon, Da Hyun Kim, Moonseek Jeong, Hyun Woo Jeong, Younghwan Lee, Seung-Yong Lee,* Jung Ho Yoon* and Min Hyuk Park*

5265



Phase stabilization *via* A-site ion anchoring for ultra-stable perovskite light emitting diodes

Shuo Ding, Zhuoyuan Kong, Yipeng Shen, Piaoyang Shen, Chunyan Wu, Lei Qian, Xinyu Zhang, Long Hu, Hao Chen* and Chaoyu Xiang*

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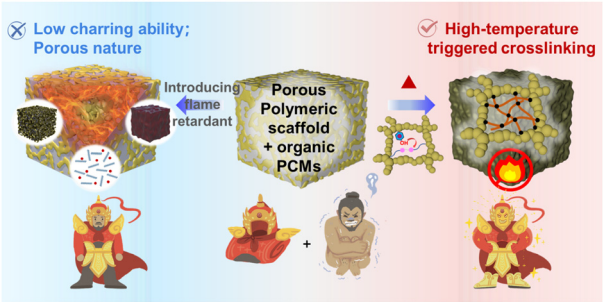
A high-temperature-triggered crosslinking reaction to achieve excellent intrinsic flame retardancy of organic phase change composites

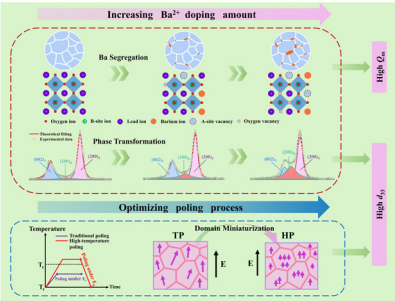
Jingkai Liu,* Yunyun Xiao, Yiqing Wang, Yishun Wuliu, Xinbei Zhu, Liyue Zhang and Xiaoqing Liu*



5285

Well-balanced performance achieved in PZT piezoceramics *via* a multiscale regulation strategy

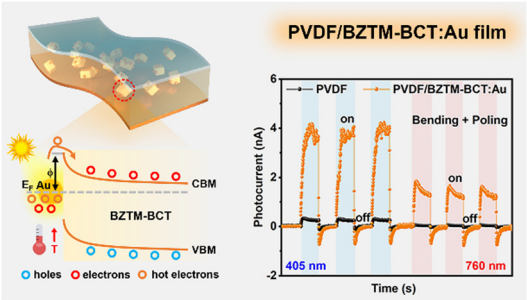
Wei Xiao, Zhengran Chen,* Xiaowei Liu, Zhiyong Zhou, Zhengqian Fu, Yizheng Tang and Ruihong Liang*



5295

Ferroelectric, flexoelectric and photothermal coupling in PVDF-based composites for flexible photoelectric sensors

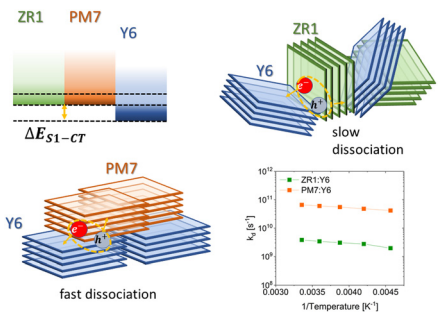
Lu Wang, Muzaffar Ahmad Boda, Chen Chen, Xiang He and Zhiguo Yi*



5304

Key factors behind the superior performance of polymer-based NFA blends

Elifnaz Sağlamkaya, Mohammad Saeed Shadabroo, Nurlan Tokmoldin, Tanner M. Melody, Bowen Sun, Obaid Alqahtani, Acacia Patterson, Brian A. Collins, Dieter Neher and Safa Shoaee*



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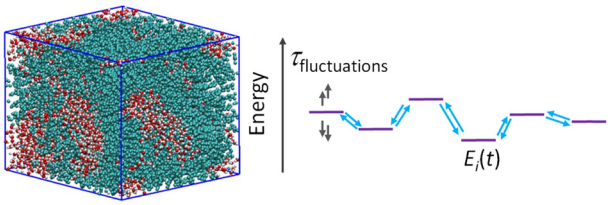
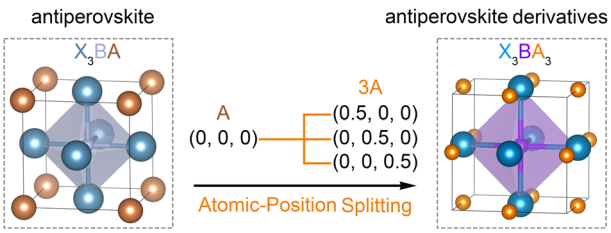


The dynamic nature of electrostatic disorder in organic mixed ionic and electronic conductors

Colm Burke, Alessandro Landi and Alessandro Troisi*

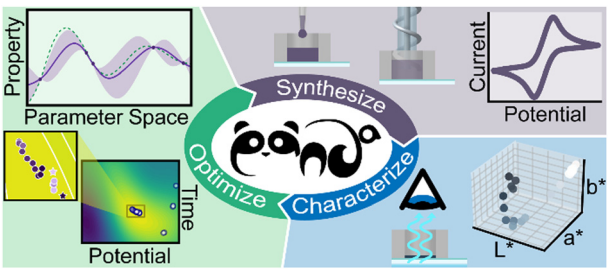
5320



Designing antiperovskite derivatives *via* atomic-position splitting for photovoltaic applications

Gang Tang,* Xiaohan Liu, Shihao Wang, Tao Hu, Chunbao Feng, Cheng Zhu, Bonan Zhu and Jiawang Hong*

5331



PANDA: a self-driving lab for studying electrodeposited polymer films

Harley Quinn, Gregory A. Robben, Zhaoyi Zheng, Alan L. Gardner, Jörg G. Werner* and Keith A. Brown*

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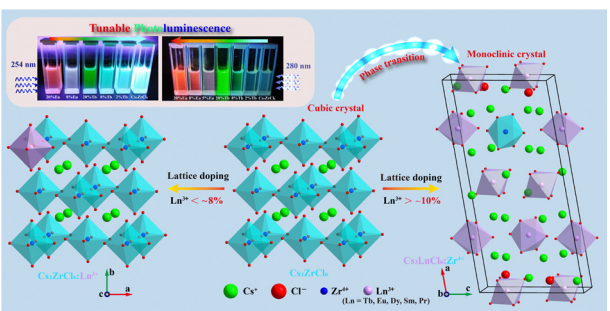

Lattice doping of lanthanide ions in Cs_2ZrCl_6 nanocrystals enabling phase transition and tunable photoluminescence

Yachong Liu, Rui Yun, Huanxin Yang, Wenda Sun, Yue Li, Haolin Lu, Libing Zhang and Xiyan Li*

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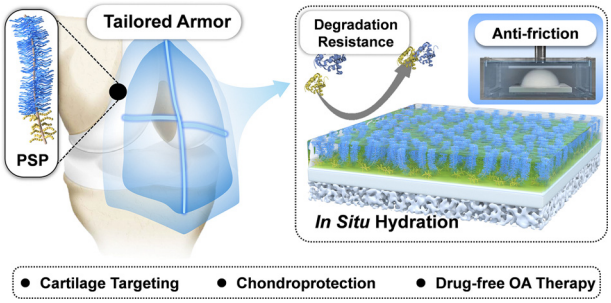
Inspired by lubricin: a tailored cartilage-armor with durable lubricity and autophagy-activated antioxidation for targeted therapy of osteoarthritis

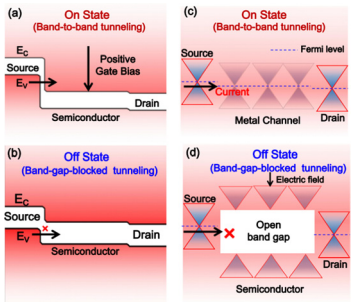
Peng Yu, Xu Peng, Hui Sun, Qiangwei Xin, Han Kang, Peng Wang, Yao Zhao, Xinyuan Xu, Guangwu Zhou, Jing Xie* and Jianshu Li*



5366

A next-generation transistor with low supply voltage operation constructed based on 2D materials' metal–semiconductor phase transition

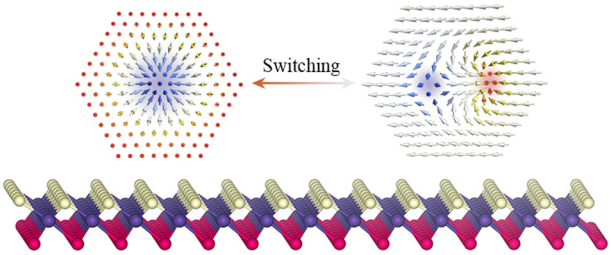
Xingyi Tan, Hengze Qu, Jialin Yang, Shengli Zhang* and Hua-Hua Fu*



5374

Strain-driven skyrmion–bimeron switching in topological magnetic monolayer CrSeBr

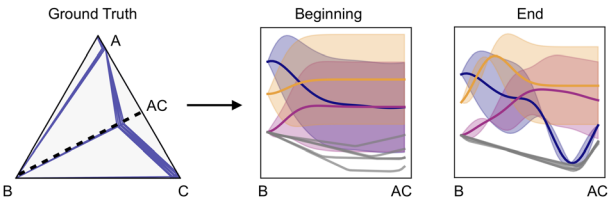
Junhuang Yang, Kaiying Dou, Xinru Li,* Ying Dai,* Baibiao Huang and Yandong Ma*



5381

Probabilistic prediction of material stability: integrating convex hulls into active learning

Andrew Novick,* Diana Cai, Quan Nguyen, Roman Garnett, Ryan Adams and Eric Toberer



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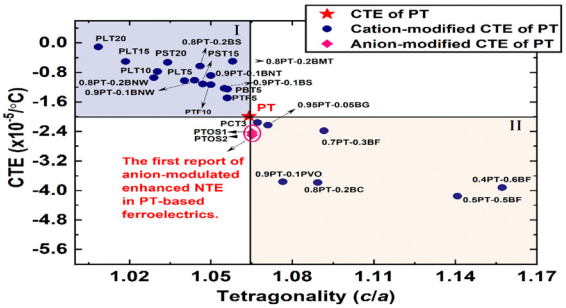
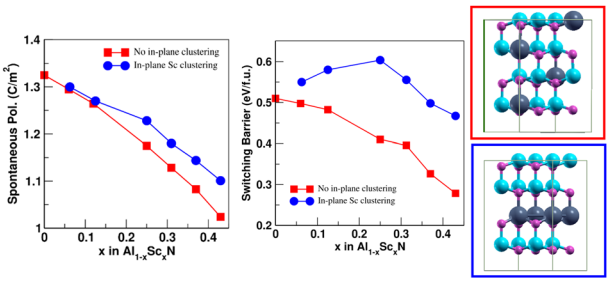


Mixed anion control of enhanced negative thermal expansion in the oxysulfide of $PbTiO_3$

Zhao Pan,* Zhengli Liang, Xiao Wang, Yue-Wen Fang,* Xubin Ye, Zhehong Liu, Takumi Nishikubo, Yuki Sakai, Xi Shen, Qiumin Liu, Shogo Kawaguchi, Fei Zhan, Longlong Fan, Yong-Yang Wang, Chen-Yan Ma, Xingxing Jiang, Zheshuai Lin, Richeng Yu, Xianran Xing,* Masaki Azuma and Youwen Long*

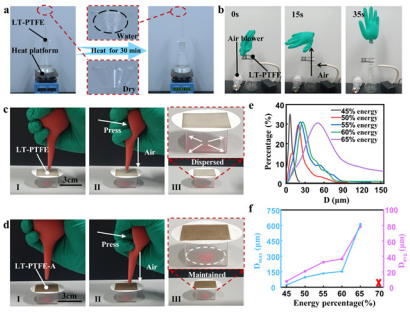
5402



Effect of Sc spatial distribution on the electronic and ferroelectric properties of AlScN

Bipin Bhattarai, Xiaoman Zhang, Wangwang Xu, Yijia Gu, W. J. Meng* and Andrew C. Meng*

5409



Alcohol-gating femtosecond laser-induced micro/nano-structured membranes with reversible switching wettability and breathability

Jiaqing Pei, Kai Yin,* Xinghao Song, Pengyu Yang, Lingxiao Wang, Yin Huang, Saif Ullah Awan and Ahmed S. G. Khalil

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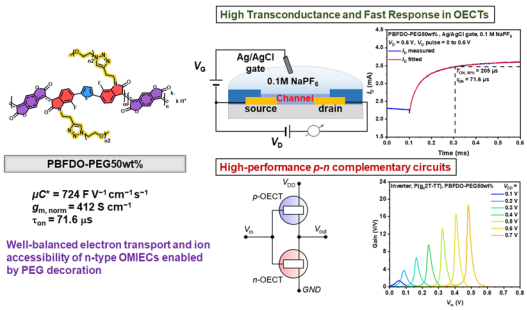

Polyethylene glycol-decorated n-type conducting polymers with improved ion accessibility for high-performance organic electrochemical transistors

Haoran Tang, Yuanying Liang, Chi-Yuan Yang,* Xi Luo, Jiangkai Yu, Kai Zhang, Simone Fabiano* and Fei Huang*

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COMMUNICATIONS

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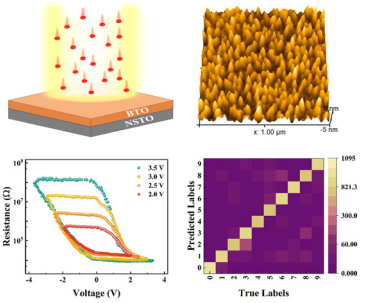
Synaptic memristors based on $BaTiO_3$ thin films irradiated by swift heavy ions for neuromorphic computing

Minghui Xu, Tao Liu,* Hailian Li, Yong Liu,* Pengshun Shan, Ruowei Wang, Weijin Kong,* Minghao Zhang, Shuangqing Fan and Jie Su*



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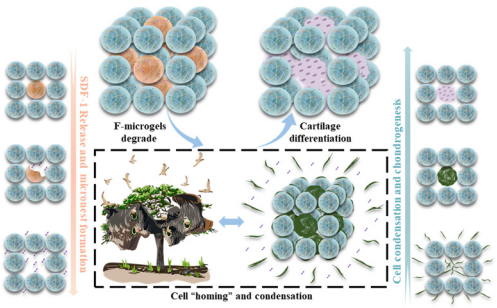
An injectable and degradable heterogeneous microgel assembly capable of forming a "micro-nest group" for cell condensation and cartilage regeneration

Zequ Lin, Qingtao Li, Xiyuan Han, Huitong Luo, Zetao Wang, Zhihao Qin, Yue Huang, Qi Feng* and Xiaodong Cao*