

# Materials Horizons

rsc.li/materials-horizons

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

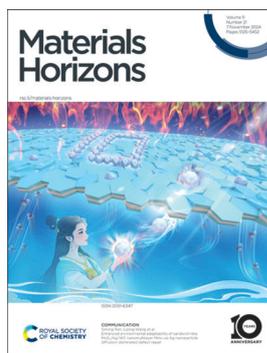
## IN THIS ISSUE

ISSN 2051-6347 CODEN MHAOAL 11(21) 5125-5452 (2024)



### 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

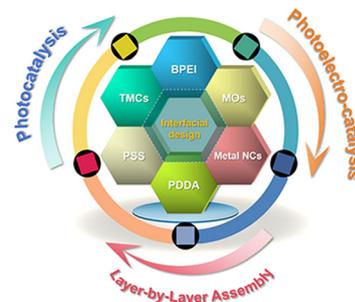
See Siming Ren, Liping Wang *et al.*, pp. 5230–5243. Image reproduced by permission of Liping Wang from *Mater. Horiz.*, 2024, 11, 5230.

## COMMENT

5136

**A reflection on 'Self-assembly of aligned rutile@anatase TiO<sub>2</sub> 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\*

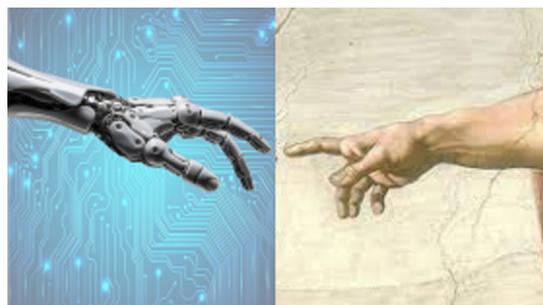


## OPINION

5141

**Reaching across the divide: materials scientists interfacing with biologists**

Rachana Acharya and Róisín M. Owens\*



**GOLD  
OPEN  
ACCESS**

# EES Solar

**Exceptional research on solar  
energy and photovoltaics**



Part of the EES family

**Join  
in** | Publish with us  
[rsc.li/EESolar](https://rsc.li/EESolar)

## REVIEWS

5147

### Alternating current electroluminescence devices: recent advances and functional applications

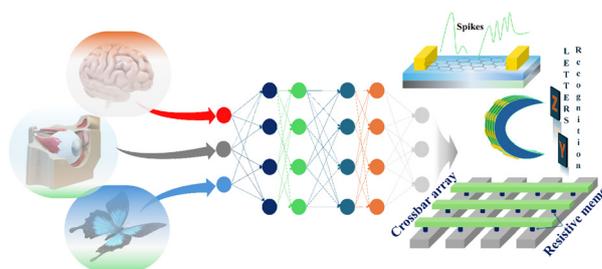
Yibin Liu, Meili Xu,\* Hui Long, Roman B. Vasiliev, Shukui Li, Hong Meng and Shuai Chang\*



5181

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

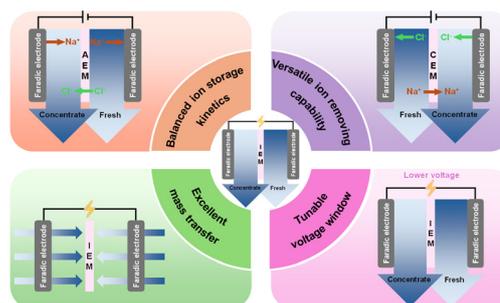
Animesh Sinha, Jihun Lee, Junho Kim and Hongyun So\*



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\*

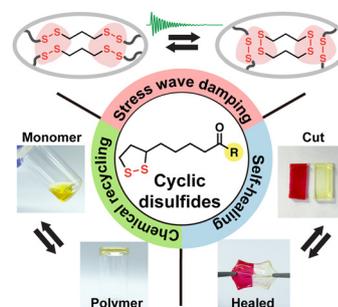


## COMMUNICATIONS

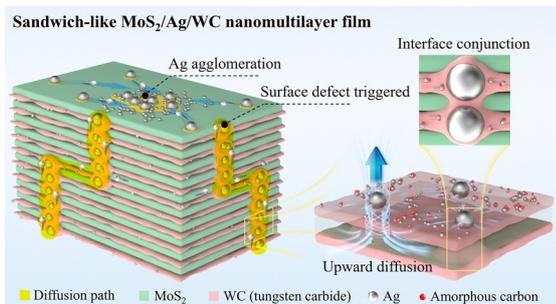
5220

### 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\*



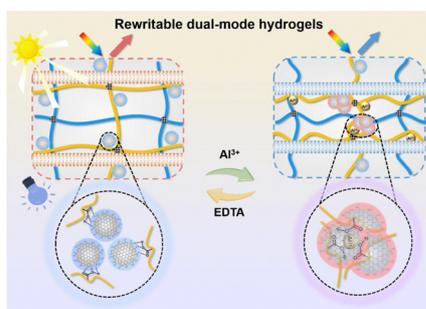
5230



### Enhanced environmental adaptability of sandwich-like MoS<sub>2</sub>/Ag/WC nanomultilayer films via Ag nanoparticle diffusion-dominated defect repair

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

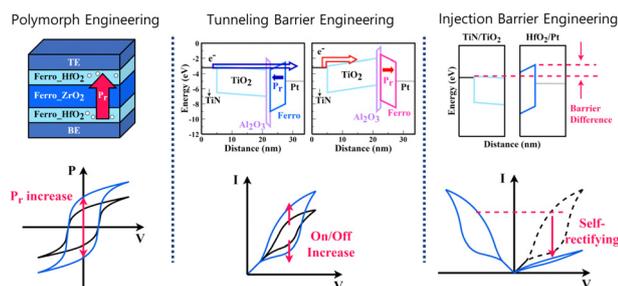
5244



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

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

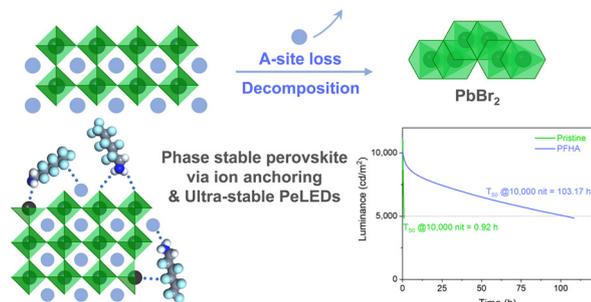
5251



### A fluorite-structured HfO<sub>2</sub>/ZrO<sub>2</sub>/HfO<sub>2</sub> 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, Taegyung 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

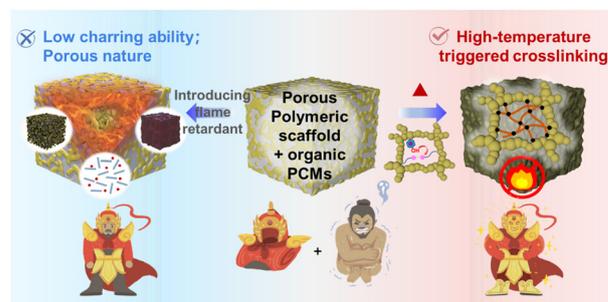
Shuo Ding, Zhuoyuan Kong, Yipeng Shen, Piaoyang Shen, Chunyan Wu, Lei Qian, Xinyu Zhang, Long Hu, Hao Chen\* and Chaoyu Xiang\*



5274

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

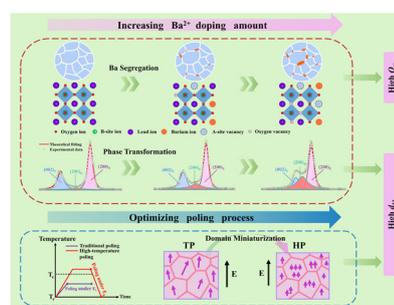
Jingkai Liu,\* Yunyun Xiao, Yiqing Wang, Yishun Wuliu, Xinbei Zhu, Liyue Zhang and Xiaoqing Liu\*



5285

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

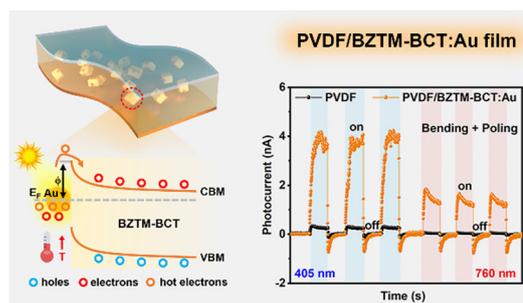
Wei Xiao, Zhengran Chen,\* Xiaowei Liu, Zhiyong Zhou, Zhengqian Fu, Yizheng Tang and Ruihong Liang\*



5295

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

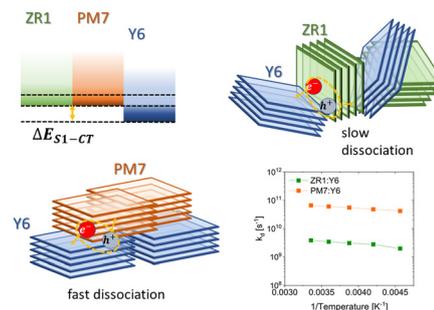
Lu Wang, Muzaffar Ahmad Boda, Chen Chen, Xiang He and Zhiguo Yi\*



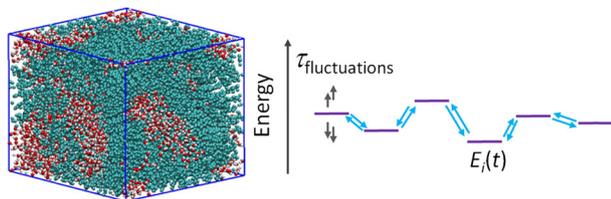
5304

### 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\*



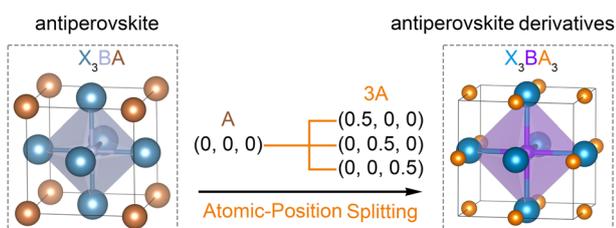
5313



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

Colm Burke, Alessandro Landi and Alessandro Troisi\*

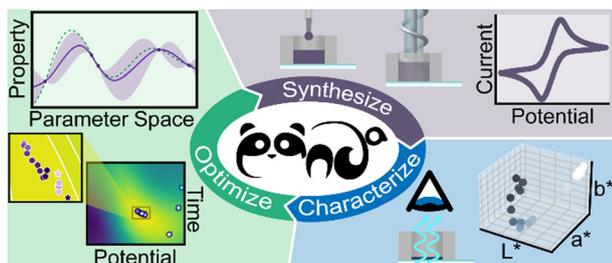
5320



### 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\*

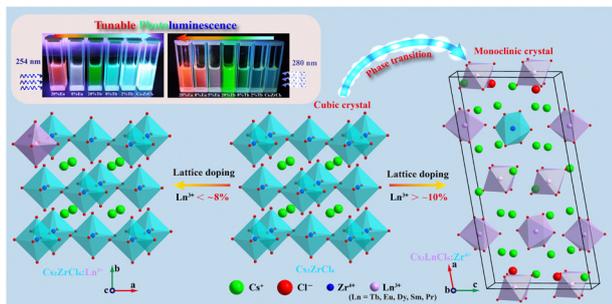
5331



### 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\*

5341



### Lattice doping of lanthanide ions in $\text{Cs}_2\text{ZrCl}_6$ nanocrystals enabling phase transition and tunable photoluminescence

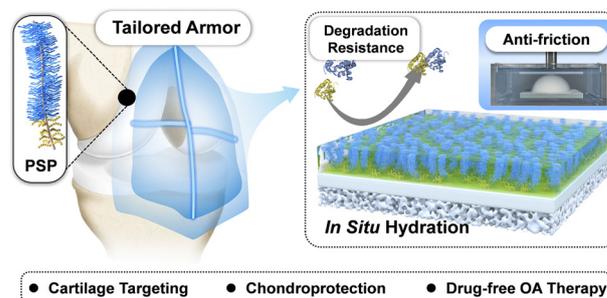
Yachong Liu, Rui Yun, Huanxin Yang, Wenda Sun, Yue Li, Haolin Lu, Libing Zhang and Xiyang Li\*



5352

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

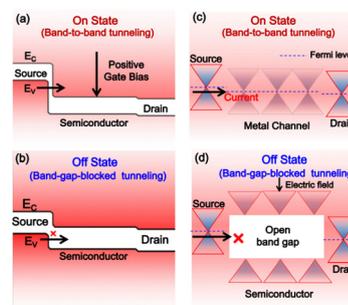
Peng Yu, Xu Peng, Hui Sun, Qiangwei Xin, Han Kang, Peng Wang, Yao Zhao, Xinyuan Xu, Guangwu Zhou, Jing Xie\* and Jianshu Li\*



5366

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

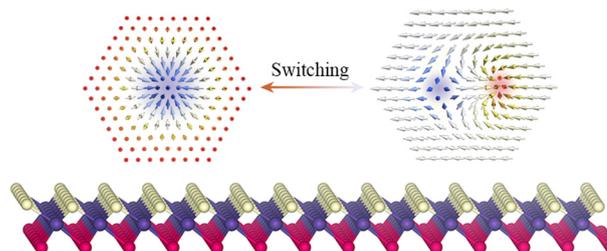
Xingyi Tan, Hengze Qu, Jialin Yang, Shengli Zhang\* and Hua-Hua Fu\*



5374

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

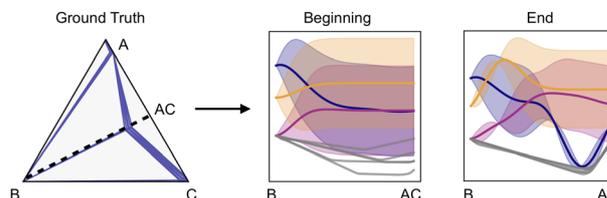
Junhuang Yang, Kaiying Dou, Xinru Li,\* Ying Dai,\* Baibiao Huang and Yandong Ma\*



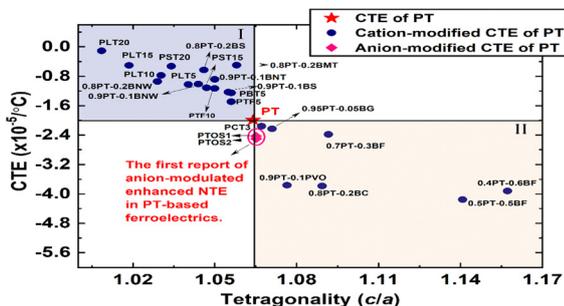
5381

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

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



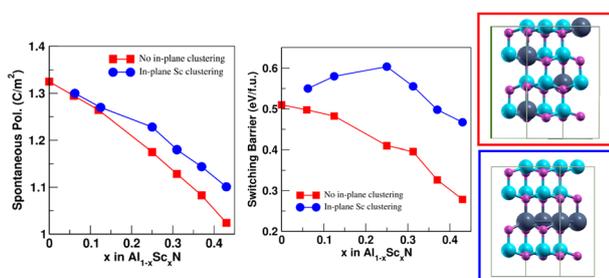
5394



### Mixed anion control of enhanced negative thermal expansion in the oxysulfide of $\text{PbTiO}_3$

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\*

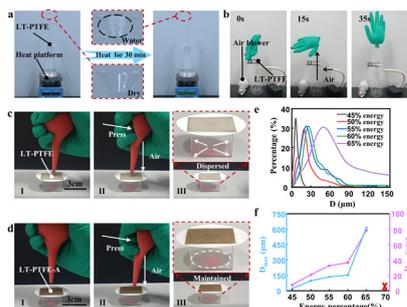
5402



### Effect of Sc spatial distribution on the electronic and ferroelectric properties of $\text{AlScN}$

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

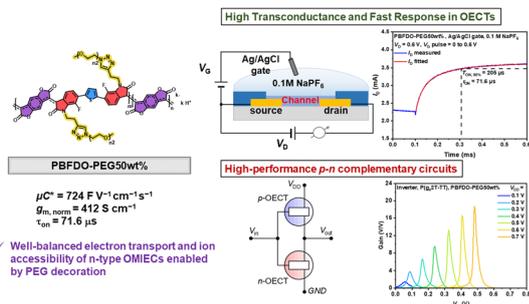
5409



### 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

5419



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

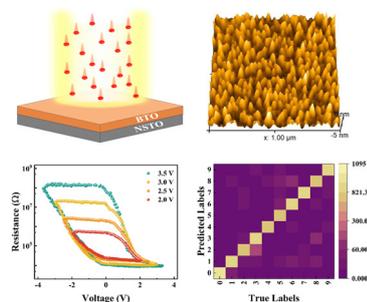
Haoran Tang, Yuanying Liang, Chi-Yuan Yang,\* Xi Luo, Jiangkai Yu, Kai Zhang, Simone Fabiano\* and Fei Huang\*



5429

### Synaptic memristors based on BaTiO<sub>3</sub> 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\*



5438

### 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\*

