

# 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(10) 2283-2530 (2024)



### Cover

See Alfred Amon, Emily E. Moore *et al.*, pp. 2382–2387. Image reproduced by permission of Alfred Amon, LLNL from *Mater. Horiz.*, 2024, 11, 2382.



### Inside cover

See Yoshiki Niihori, Yuichi Negishi *et al.*, pp. 2304–2322. Image reproduced by permission of Yuichi Negishi from *Mater. Horiz.*, 2024, 11, 2304.

## EDITORIALS

2292

**Materials Horizons Emerging Investigator Series:**  
Professor Yiyang Li, University of Michigan, USA



2294

**Materials Horizons 2023 Outstanding Paper awards**



# Advance your career in science

with professional recognition that showcases  
your **experience, expertise and dedication**

## Stand out from the crowd

Prove your commitment  
to attaining excellence in  
your field

## Gain the recognition you deserve

Achieve a professional  
qualification that inspires  
confidence and trust

## Unlock your career potential

Apply for our professional  
registers (RSci, RSciTech)  
or chartered status  
(CChem, CSci, CEnv)

## Apply now

[rsc.li/professional-development](https://rsc.li/professional-development)

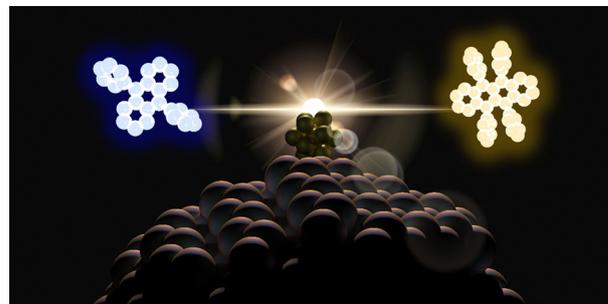


## REVIEWS

2304

## Triplet–triplet annihilation-based photon upconversion using nanoparticles and nanoclusters

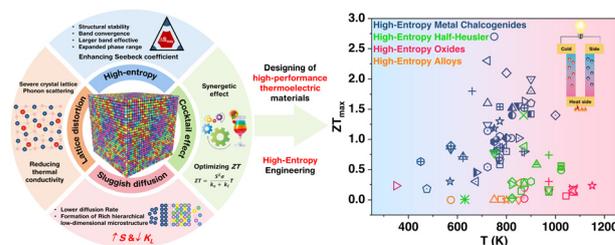
Yoshiki Niihori,\* Taiga Kosaka and Yuichi Negishi\*



2323

## High-entropy materials for thermoelectric applications: towards performance and reliability

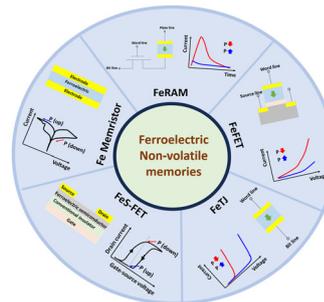
Nouredine Ouedna,\* Noha Sabi, Hasna Aziam, Vera Trabadelo and Hicham Ben Youcef\*



2355

## Growth of emergent simple pseudo-binary ferroelectrics and their potential in neuromorphic computing devices

Ampattu R. Jayakrishnan, Ji S. Kim, Markus Hellenbrand, Luis S. Marques, Judith L. MacManus-Driscoll\* and José P. B. Silva\*

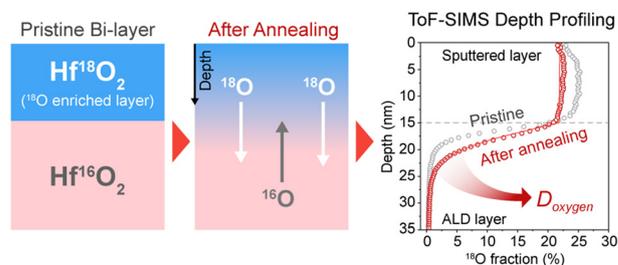


## COMMUNICATIONS

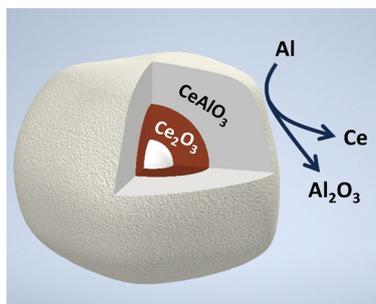
2372

## Oxygen tracer diffusion in amorphous hafnia films for resistive memory

Dongjae Shin, Anton V. Ilev, Karsten Beckmann, Jingxian Li, Pengyu Ren, Nathaniel Cady and Yiyang Li\*



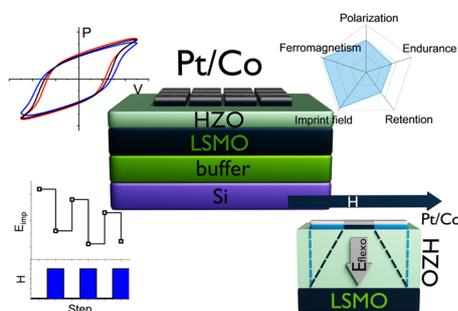
2382



### Aluminothermic reduction of $\text{CeO}_2$ : mechanism of an economical route to aluminum–cerium alloys

Alfred Amon,\* Emily E. Moore,\* Hunter B. Henderson, Jibril Shittu, Martin Kunz, Shane Kastamo, Nikolai Huotari, Adam Loukus, Ryan Ott, David Weiss and Scott K. McCall

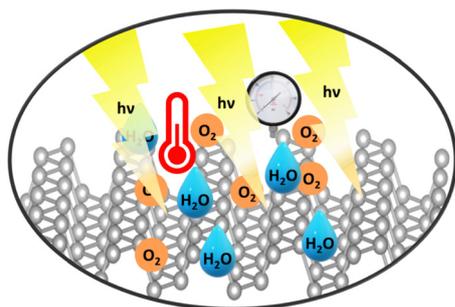
2388



### Robust multiferroicity and magnetic modulation of the ferroelectric imprint field in heterostructures comprising epitaxial $\text{Hf}_{0.5}\text{Zr}_{0.5}\text{O}_2$ and Co

Tetiana Zakusylo, Alberto Quintana, Veniero Lenzi, José P. B. Silva, Luis Marques, José Luis Ortolá Yano, Jike Lyu, Jordi Sort, Florencio Sánchez\* and Ignasi Fina\*

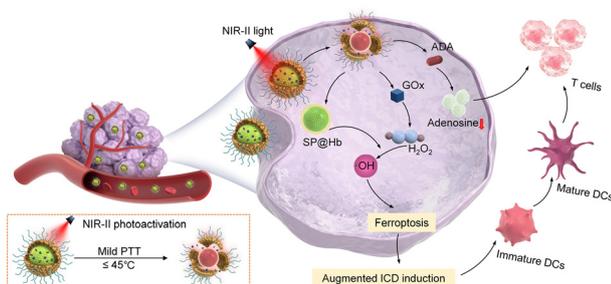
2397



### Memory effect and coexistence of negative and positive photoconductivity in black phosphorus field effect transistor for neuromorphic vision sensors

Arun Kumar,\* Kimberly Intonti, Loredana Viscardi, Ofelia Durante, Aniello Pelella, Osamah Kharsah, Stephan Sleziona, Filippo Giubileo, Nadia Martucciello, Paolo Ciambelli, Marika Schleberger and Antonio Di Bartolomeo\*

2406



### Dual-enzyme decorated semiconducting polymer nanoagents for second near-infrared photoactivatable ferroptosis-immunotherapy

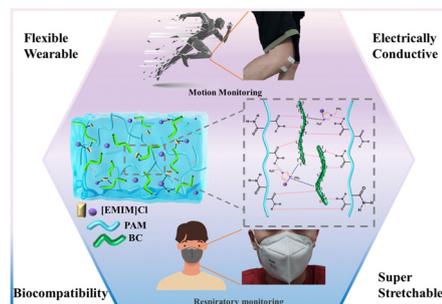
Yue Liu, Renjie Lu, Meng Li, Danling Cheng, Fengshuo Wang, Xumei Ouyang, Yitian Zhang, Qin Zhang,\* Jingchao Li\* and Shaojun Peng\*



2420

### Hyper strength, high sensitivity integrated wearable signal sensor based on non-covalent interaction of an ionic liquid and bacterial cellulose for human behavior monitoring

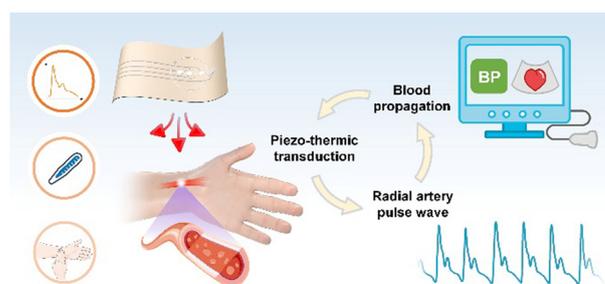
Xuhui Rong, Qijun Ding,\* Luzheng Chen, Shuo Yang, Jiang Lou, Zhuqing Liu, Xia Li, Yifei Jiang, Xiaolei Wang and Wenjia Han\*



2428

### A flexible multimodal pulse sensor for wearable continuous blood pressure monitoring

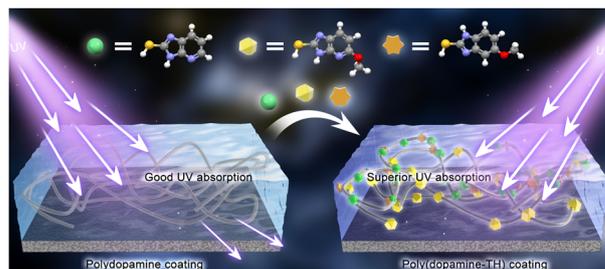
Shuo Tian, Liangqi Wang and Rong Zhu\*



2438

### UV absorption enhanced polydopamine coating

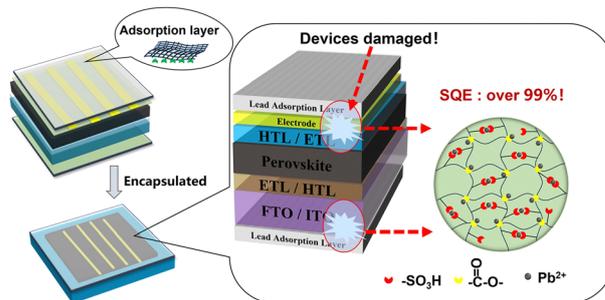
Zhen Yang, Huijie Liu, Junyi Zhao, Chao Wang, Haotian Li, Xianheng Wang, Ye Yang, Haoxing Wu,\* Zhipeng Gu\* and Yiwen Li\*



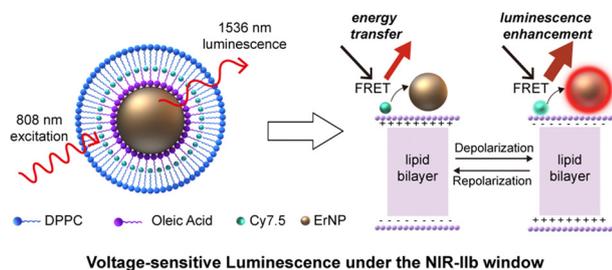
2449

### Preventing lead leakage in perovskite solar cells and modules with a low-cost and stable chemisorption coating

Zongxu Zhang, Yating Shi, Jiujiang Chen, Peng Shen, Hongshi Li, Mengjin Yang, Shirong Wang, Xianggao Li and Fei Zhang\*



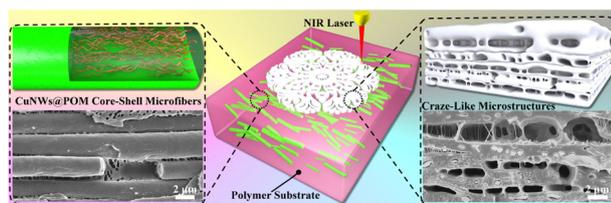
2457



### An NIR-IIb emissive transmembrane voltage nano-indicator for the optical monitoring of electrophysiological activities *in vivo*

Zhenyu Xing, Qian Hu, Weikan Wang, Na Kong, Rong Gao, Xiaolei Shen, Sixin Xu, Lingkai Meng, Jian-Ren Liu and Xingjun Zhu\*

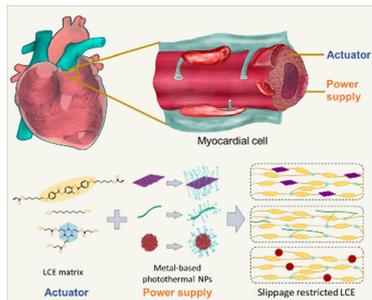
2469



### Laser-induced locally controllable craze-like microstructures for polymer white structural coloration

Jin Feng, Rui Xu, Jiameng Huang and Tao Zhou\*

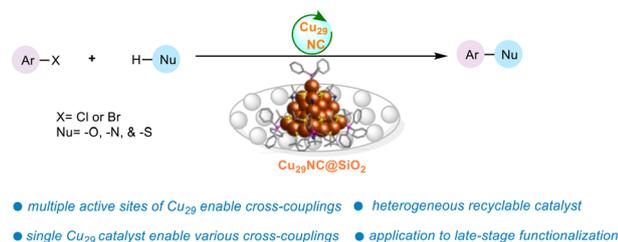
2483



### 4D Printable liquid crystal elastomers with restricted nanointerfacial slippage for long-term-cyclic-stability photothermal actuation

Juzhong Zhang, Shuiren Liu,\* Xianghong Wang, Xiaomeng Zhang, Xiaoguang Hu, Linlin Zhang, Qingqing Sun and Xuying Liu\*

2494



### Multiple neighboring active sites of an atomically precise copper nanocluster catalyst for efficient bond-forming reactions

Atanu Ghosh, Arunachalam Sagadevan, Kathiravan Murugesan, Stefan Adrian F. Nastase, Bholanath Maity, Mohammad Bodiuzzaman, Aleksander Shkurenko, Mohamed Nejib Hedhili, Jun Yin, Omar F. Mohammed, Mohamed Eddaoudi, Luigi Cavallo, Magnus Rueping\* and Osman M. Bakr\*

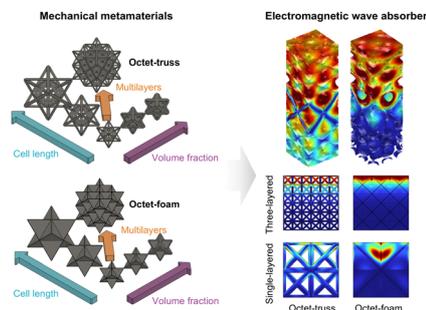


## COMMUNICATIONS

2506

### Mechanical metamaterials as broadband electromagnetic wave absorbers: investigating relationships between geometrical parameters and electromagnetic response

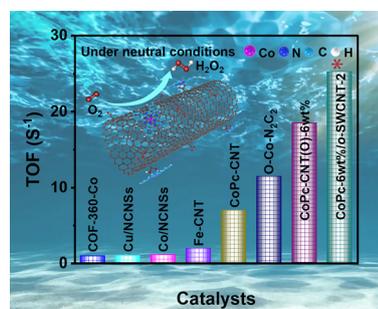
Dahyun Daniel Lim, Sangryun Lee, Jeong-Ho Lee, Wonjoon Choi\* and Grace X. Gu\*



2517

### Highly coordinative molecular cobalt–phthalocyanine electrocatalyst on an oxidized single-walled carbon nanotube for efficient hydrogen peroxide production

Yaoxin Li, Haoying Cheng, Meilin Wang, Jiaoxing Xu\* and Lunhui Guan\*



## CORRECTION

2528

### Correction: Kirigami-enabled stretchable laser-induced graphene heaters for wearable thermotherapy

Junyu Chen, Yichao Shi, Binbin Ying, Yajie Hu, Yan Gao, Sida Luo\* and Xinyu Liu\*

