

# Materials Horizons

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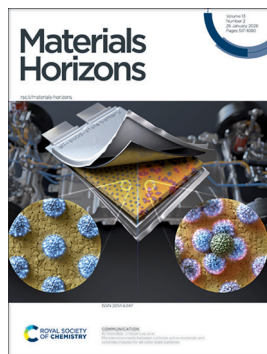
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ISSN 2051-6347 CODEN MHAOAL 13(2) 517-1080 (2026)



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See Keeyoung Jung, Inchul Park *et al.*, pp. 727–735. Image reproduced by permission of Inchul Park from *Mater. Horiz.*, 2026, 13, 727.



### Inside cover

See Ki Yoon Bae, Ji Hoon Lee *et al.*, pp. 736–747. Image reproduced by permission of Ji Hoon Lee from *Mater. Horiz.*, 2026, 13, 736.

## EDITORIAL

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**Materials Horizons Emerging Investigator Series:**  
Dr Youfu Wang, Shanghai Jiao Tong University, China

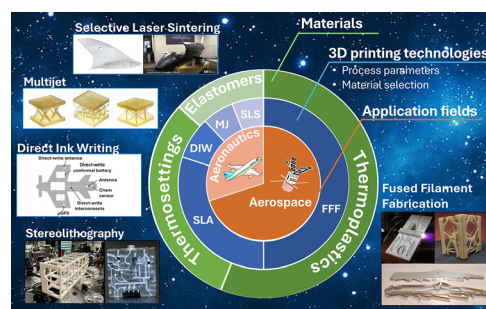


## REVIEWS

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**Additive manufacturing of polymers and composites for applications in aerospace and aeronautics**

Francesca Aliberti,\* Raffaele Longo, Marialuigia Raimondo, Roberto Pantani, Luigi Vertuccio and Liberata Guadagno\*



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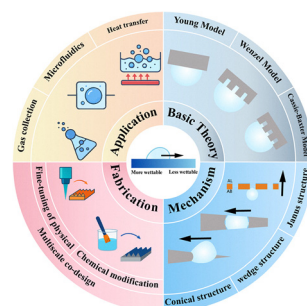
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## Directional manipulation of bubble behavior on wettability gradient surfaces: mechanisms, strategies, and applications

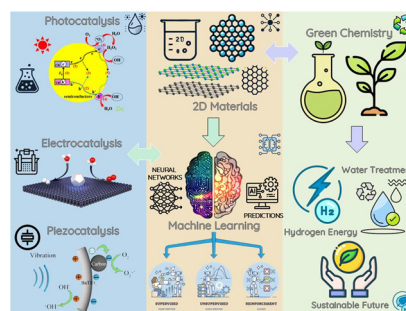
Ziqiang Zhu, Fuchao Yang,\* Daheng Wu\* and Zhiguang Guo\*



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## Machine learning (ML)-assisted development of 2D green catalysts to support sustainability

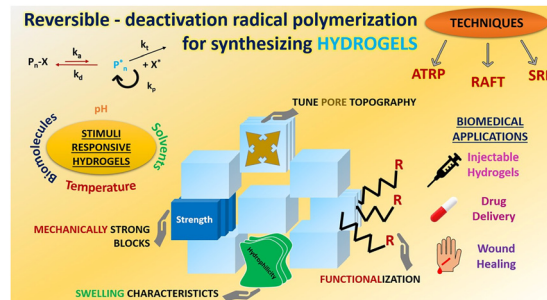
Manshu Dhillon, Soumya Mahapatra, Adreeja Basu, Shyam S. Pandey, Manpreet Singh Manna, Shantanu Bhattacharya, Basab Chakraborty, Ajeet Kaushik and Aviru Kumar Basu\*



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## Harnessing precision in hydrogel architectures through reversible-deactivation radical polymerisation techniques

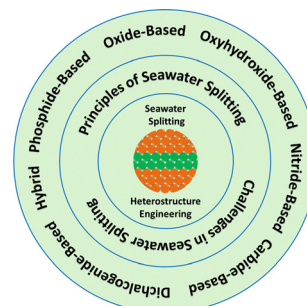
Amit Kumar,\* Pratibha Sharma and Andrew B. Lowe\*



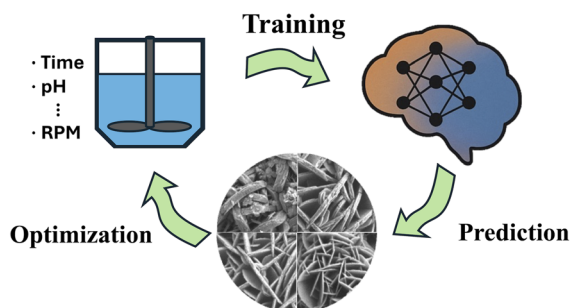
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## Recent advancements in heterostructure-based electrocatalysts for sustainable hydrogen production through seawater splitting

Samavia Rafiq, Farhan Arshad, Mohammed A. Gondal,\* Mohamed Jaffer Sadiq Mohamed and Munerah Abdullah Almessiere



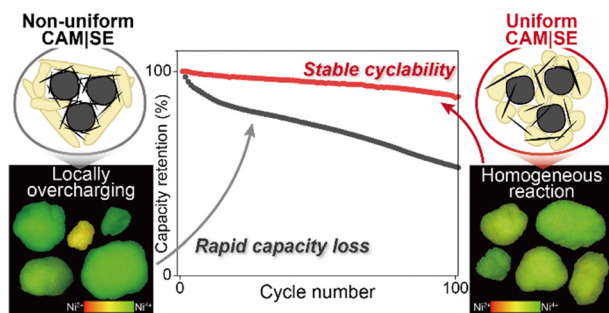
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### Generative inverse design for microstructure control in precursors for Li- and Mn-rich layered-oxide cathodes

Geunho Choi, Changwan Lee, Jieun Kim, Insoo Ye, Keeyoung Jung\* and Inchul Park\*

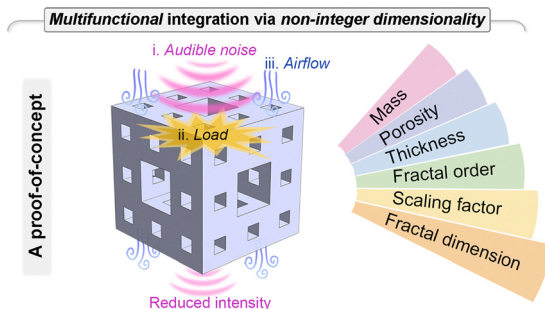
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### Microenvironments between cathode active materials and solid electrolytes for all-solid-state batteries

Ju-Hyeon Lee, Eun Seo Kang, Ji Young Kim, Ki Yoon Bae\* and Ji Hoon Lee\*

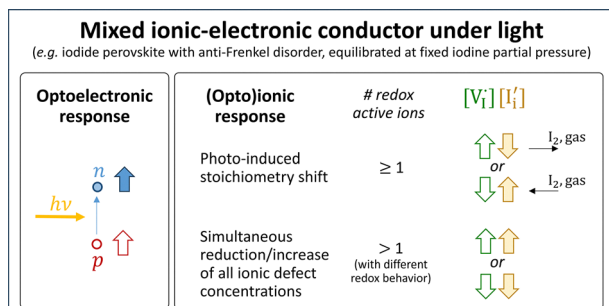
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### Non-integer-dimensional architected materials enabling synergistic acoustic, mechanical, and fluid coupling

Zichao Guo, Ziping Lei, Kexin Zeng, Yiman Chen, Zhonggang Wang\*, Zheng Fan\* and Zhendong Li\*

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### Defect chemistry of mixed ionic–electronic conductors under light: halide perovskites as a master example

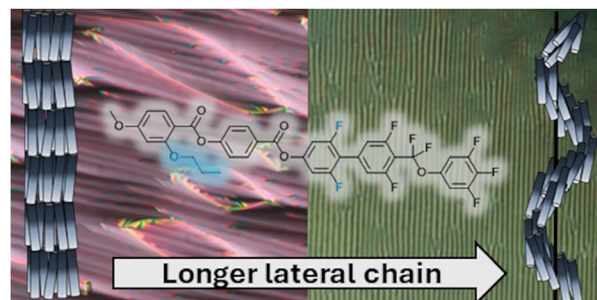
Davide Moia\* and Joachim Maier



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### Competition between mirror symmetry breaking and translation symmetry breaking in ferroelectric liquid crystals with increasing lateral substitution

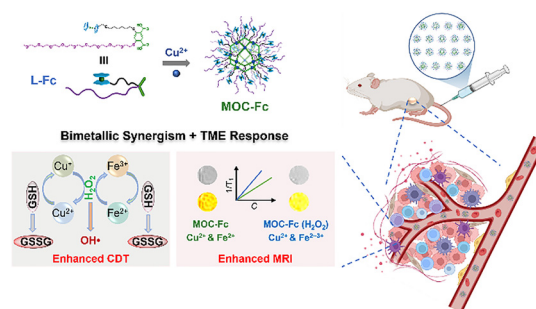
Grant J. Strachan,\* Ewa Górecka and Damian Pocięcha



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### Bimetallic organic cages as precise theranostic nanoplatforms for self-enhanced magnetic resonance imaging and chemodynamic therapy

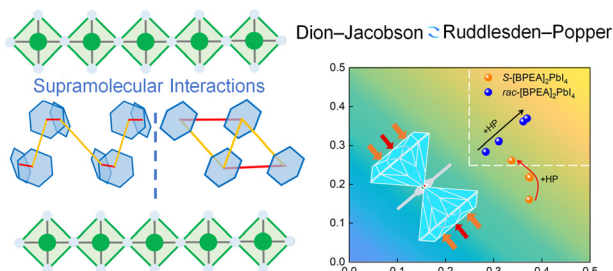
Yucen Deng, Xin Fang, Yingfang Lv, Xinyuan Zhu, Youfu Wang,\* Xiaoyan Wang\* and Xuesong Feng\*



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### Pressure-driven interconversion between Ruddlesden–Popper and Dion–Jacobson phases in two-dimensional hybrid perovskites via supramolecular interactions

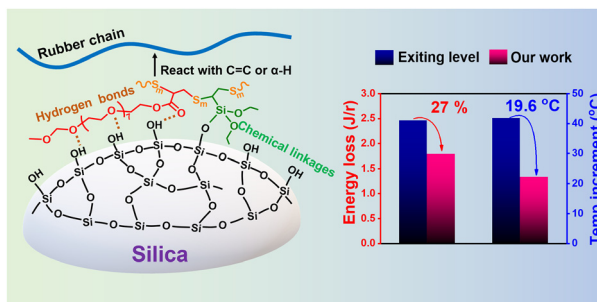
Feifei Gao,\* Xiang Li, Ying Zhang, Yan Qin, Hai-Peng Song, Min Wu, Shuqi Zhang, Xu Wang, Wei Li, Xiang Wu and Hui Xu\*



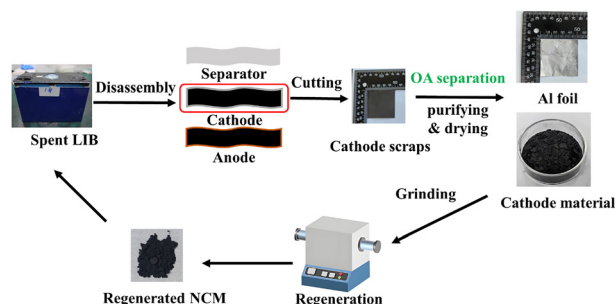
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### Inverse vulcanization enabled self-motivated polysulfide silane: an ultra-efficient interfacial architecture for silica-filled elastomer hybrids

Dong Wang, Yun Duan, Jialiang Cheng, Yiting Zhang, Zhenghai Tang,\* Panchao Yin, Baochun Guo\* and Liqun Zhang



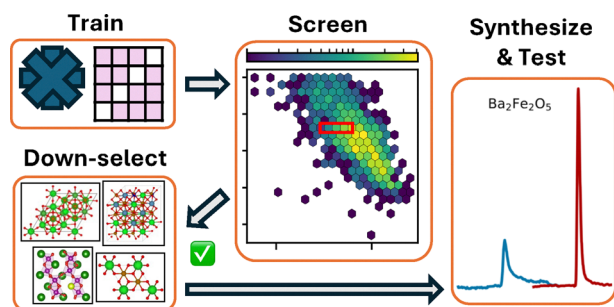
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### Efficient separation of the NCM cathode material and Al foil from spent lithium-ion batteries with oxalic acid under mild conditions

Yuzhang Xiao, Zhi Gao, Weihao Lin, Guangyao Yang, Sikai Peng, Yihong Tong, Weiliang Peng,\* Bin Yuan,\* Renzong Hu and Wei Min Huang

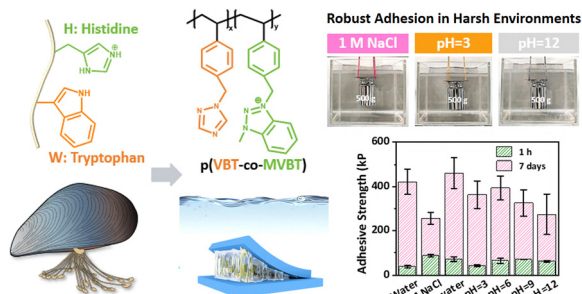
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### Large-scale experimental validation of thermochemical water-splitting oxides discovered by defect graph neural networks

Tyra C. Douglas, Michael J. Dzara, Andrew J. E. Rowberg, Keith A. King, Maria Syrigou, Nicholas A. Strange, Robert T. Bell, Anuj Goyal, Pin-Wen Guan, Robert B. Wexler, Joel B. Varley, Tadashi Ogitsu, Stephan Lany, Anthony H. McDaniel, Sean R. Bishop\* and Matthew D. Witman\*

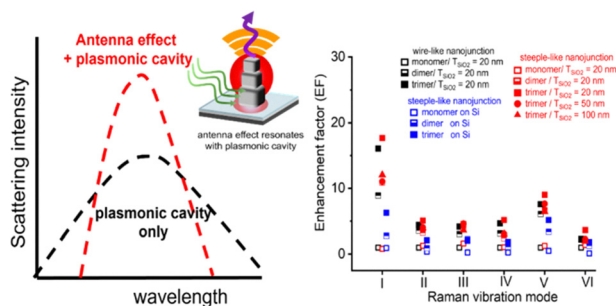
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### Biomimetic underwater adhesives based on IL-mediated coacervation

Yuming Deng, Haochen Ni, Yueman Tang, Bingjie Liu, Hongyao Ding, Gaopeng Wang, Si Yu Zheng\* and Jintao Yang\*

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### Introducing plasmonic antenna nanojunctions into nanocavity structures to confine and enhance their local electromagnetic fields

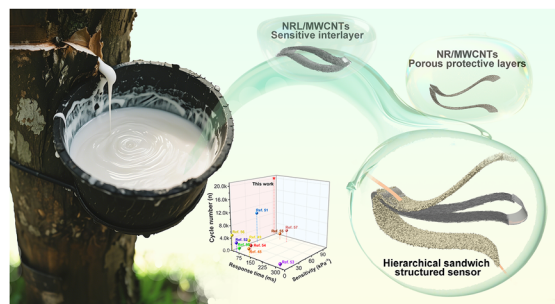
Yu-Hsun Liao, Li-Kai Luo and Su-Wen Hsu\*



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### Supersensitive natural rubber-based piezoresistive pressure sensor with hierarchical sandwich structure

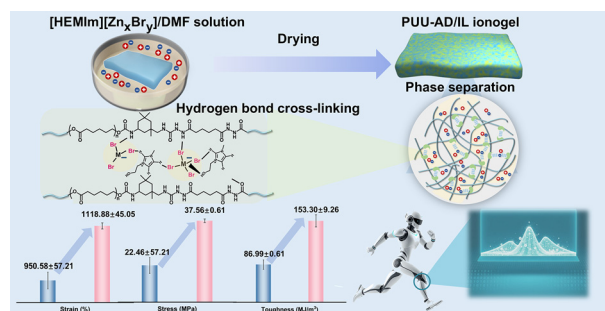
Han Lu, Hongfu Xie, Guhuan Chen, Junyi Zhang, Binyu Zhu, Bozhi Zhou, Xuejun Lai, Hongqiang Li\* and Xingrong Zeng



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### Synergistic enhancement of the mechanical properties of polyurethane ionogel by halometallate ionic liquid-induced phase separation and hydrogen bond cross-linking

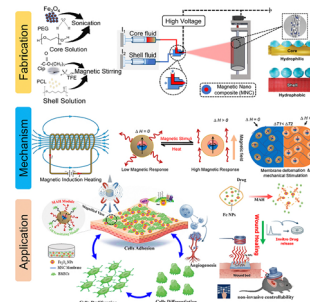
Wanjiang Li, Shaoji Wu, Chuhao Ma, Xulian Hu, Pan Wu and Yurong Yan\*



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### Magnetothermal nanocomposite scaffolds with dual stimulation for synergistic drug delivery and cellular modulation in wound healing

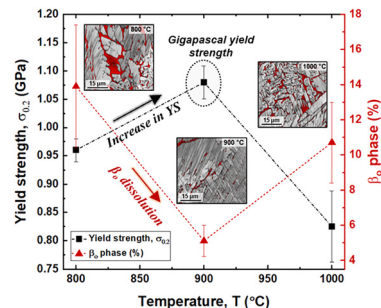
Muhammad Azam Fareed, Bing Zhang, Kashan Memon, Muhammad Hassan, Yousaf Raza and Gang Zhao\*



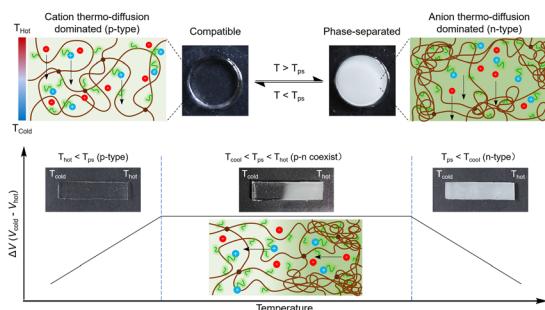
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### Gigapascal yield strength at 900 °C in a boron-free TiAl complex alloy having excellent room temperature formability

S. S. Nene,\* A. R. Balpande and A. Dutta



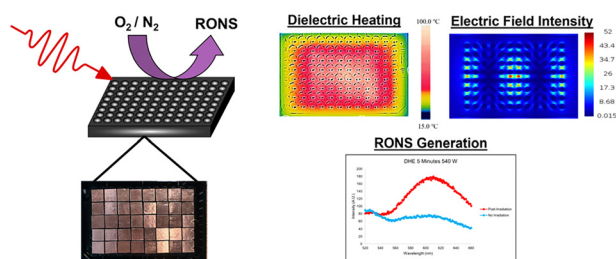
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### P–N switchable thermoelectric ionogels enabled by microphase separation for intelligent thermal sensing

Lie Chen, Cong Zhao, Xin Fu, Longhao Zhang, Xiaozheng Duan, Tianyi Zhao, Xuanbo Zhu\* and Mingjie Liu\*

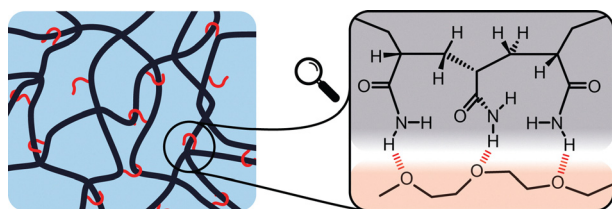
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### Applying spoof-plasmonic metasurfaces to microwave sample preparation of biological samples

Zach E. Nichols, Michelle Zhang, Vanshika Agarwal, Benjamin Koepp, Ethan Denny, Ahmed Al-Anesi, Sarasi Gunasekara, Ali Mutasim and Chris D. Geddes\*

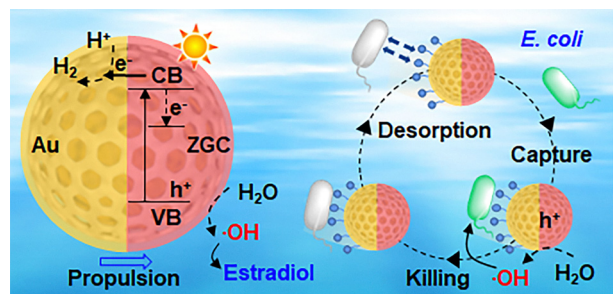
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### Enhanced toughness in highly entangled hydrogels via non-covalent molecular hooks

Élise Ansart, Lucien Cousin, Mark W. Tibbitt and Stefan Mommer\*

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### Self-electrophoresis-propelled and self-built electric field-enhanced photocatalytic nanomotors for round-the-clock environmental remediation

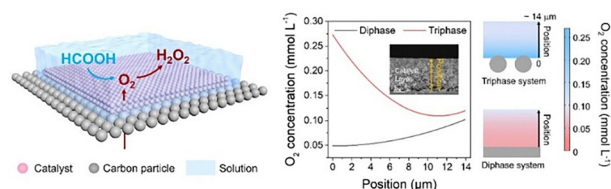
Zhanlin Zhang, Qiuyu Li, Wenxiong Cao, Junwu Wei, Long He, Xiaotong Zheng\* and Xiaohong Li\*



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### Interfacial microenvironment and catalyst modulation for efficient hydrogen peroxide synthesis via mimicking oxidase catalysis

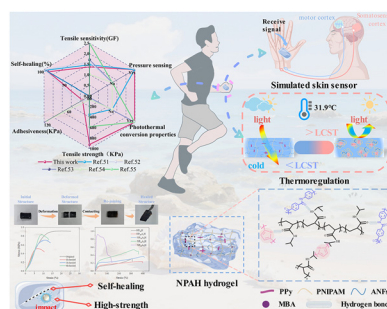
Zhiping Liu, Siyu Zou, Xi Chen, Lihui Huang, Xia Sheng\* and Xinjian Feng\*



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### Skin-inspired high-strength, adhesive, healable and smart thermoregulation hydrogel sensors for multi-sensing via one-pot PET-RAFT

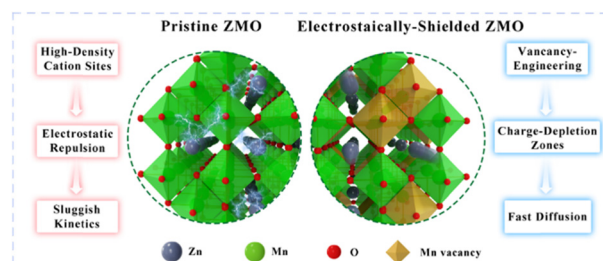
Yifan Yan, Wenqing Wang,\* Chudan Zhang, Menghan Guo, Liran Zhang, Pengfei Qi and Rui Wang



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### Expedited Zn<sup>2+</sup> diffusion in electrostatically shielded tunnels triples the capacity of spinel ZnMn<sub>2</sub>O<sub>4</sub>

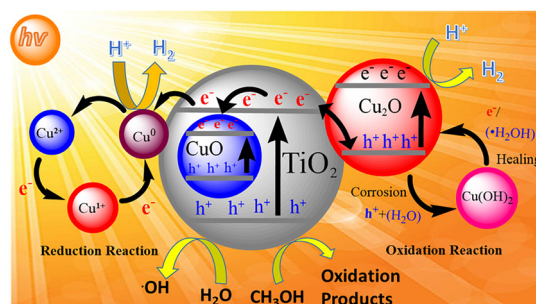
Zihan Xu, Mei Han, Yu Wang, Kaihang Yue and Jian Zhi\*



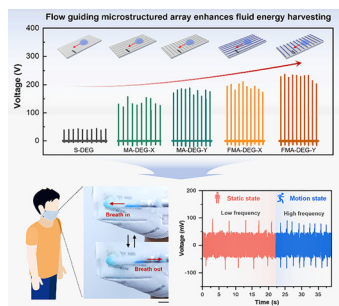
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### Self-healing redox chemistry in Cu–TiO<sub>2</sub> photocatalysts for enhanced hydrogen production

Mariyum Yousaf, Hui Hu, Faheem Abbas, Xuxing Chen, Yongge Wei, Muhammad Sohail\* and Yun Gao\*



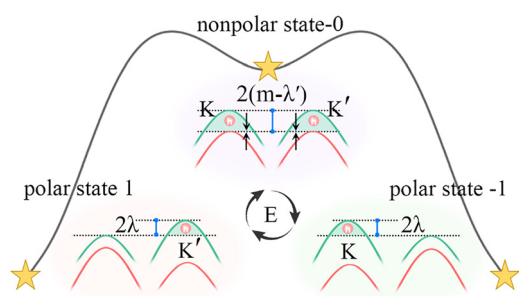
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### Highly efficient fluid energy harvesting via flow guiding rapid charge transfer for advanced nanogenerators

Ke Li, Honghao Li, Lu Li, Yuliang Li, Linyang Li, Chunyu Zhang, Xiaofang Zhang,\* Lei Jiang and Dongliang Tian\*

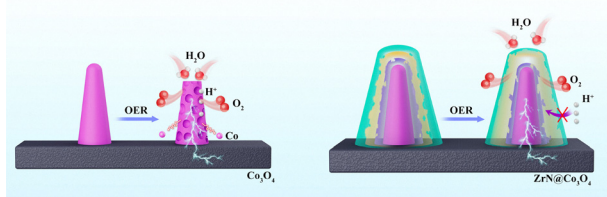
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### Ferroelectric switchable valleytricity in 2D multiferroic semiconductors

Shuyan Chai, Wei Wei, Xinru Li,\* Ying Dai,\* Baibiao Huang and Yandong Ma\*

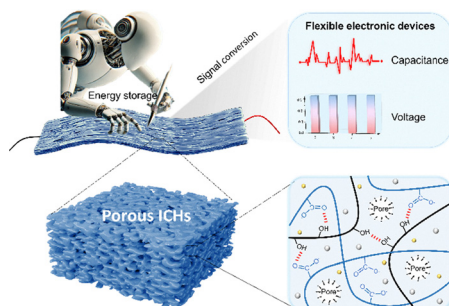
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### Self-adaptive ZrN coating enables stable acidic oxygen evolution on $\text{Co}_3\text{O}_4$ through dynamic surface reconstruction

Zheng Han, Ali Sufyan, Jiaxian Zheng, Jiahao Li, Xin Liu, Lujiao Mao, Erik van Loon\* and Hanfeng Liang\*

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### *In situ* generated bubble-mediated porous ionically conductive hydrogels for hydrogel-based electronics

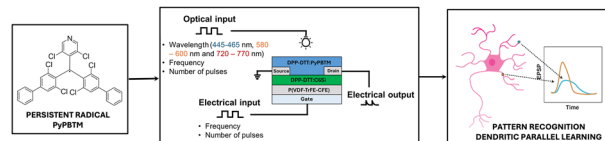
Ping Wu, Xufei An, Bohui Zheng, Wuque Wang, Kexuan Wang, Hanbin Liu, Yao Yao\* and Hongwei Zhou\*



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### Persistent radicals in organic photonic synaptic transistors for pattern recognition of electrical and multicolor optical stimuli

Giulia Baroni, Francesco Reginato, Ugo Bruno, Francesco Porcelli, Giuseppe Mattioli, Sara Mattiello, Luca Beverina, Mario Prosa, Margherita Bolognesi, Francesca Santoro\* and Stefano Toffanin\*



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### Pb-S coordination-assisted *in situ* ligand engineering of CsPbBr<sub>3</sub> nanocrystals using (3-mercaptopropyl)methyldimethoxysilane for enhanced robustness and optoelectronic properties

Jin Young Kim, Tae Yong Im, Jihyun Lim, Byung Gi Kim, Emad S. Goda, Jun Ho Choi, Jeong Wan Park and Dong Hwan Wang\*

