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# Materials Horizons

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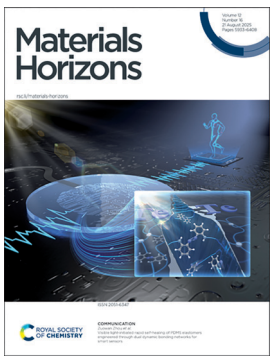


**Inside cover**
See Zuowan Zhou *et al.*, pp. 6143–6154. Image reproduced by permission of Zuowan Zhou from *Mater. Horiz.*, 2025, **12**, 6143.

## FOCUS

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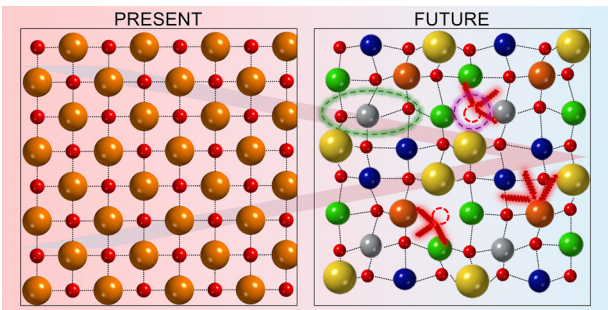
**Beyond the four core effects: revisiting thermoelectrics with a high-entropy design**

Corey Oses,* Tianhao Li, Xiao Xu, Guangshuai Han, Guotao Qiu and Jonathan R. Owens

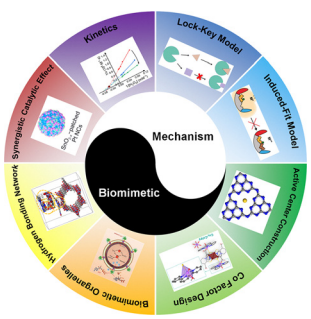



## REVIEWS

5957

**Bioinspired rational design of nanozymes**

Zhihong Chen, Bingyan Li, Yiqing Zhang, Xinyue Shang, Cheng Ma, Weiwei Gao* and Zhiling Zhu*



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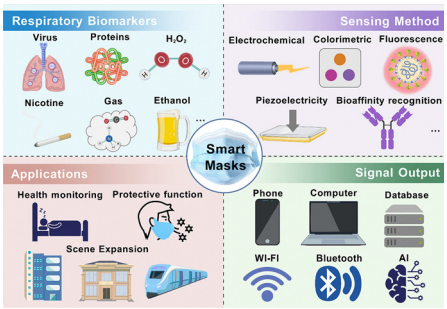
## REVIEWS

5975

**Innovative biosensing smart masks: unveiling the future of respiratory monitoring**

Jiahui Liang, Conghui Liu* and Tailin Xu

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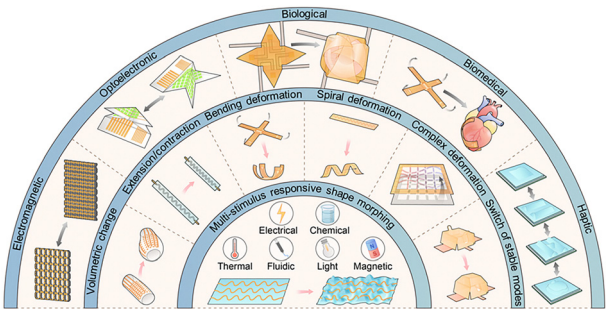
**Shape-morphing bioelectronic devices**

Shiwei Xu, Ruoxi Yang, Youzhou Yang and Yihui Zhang*

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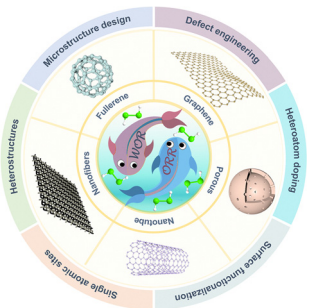
**Innovative engineering strategies and mechanistic insights for enhanced carbon-based electrocatalysts in sustainable $H_2O_2$ production**

Shun Li,* Zhanpeng Zhu, Yuqiao Zhang, Yong Liu, Xinyue Zhang* and Kwun Nam Hui*

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**Recent advances in nanomaterial-based adsorbents for removal of pharmaceutical pollutants from wastewater**

Khalid Aziz, Nadeem Raza, Natasha Kanwal, Mohamed Khairy, Younes Ahmadi and Ki-Hyun Kim*

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## REVIEWS

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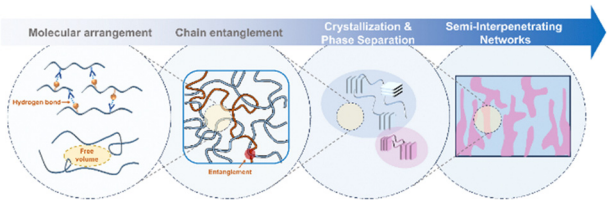


**Control of molecular aggregation structures towards flexible organic photovoltaics**

Jiayuan Zhu, Cenqi Yan,* Jiayu Wang, Hongxiang Li and Pei Cheng*

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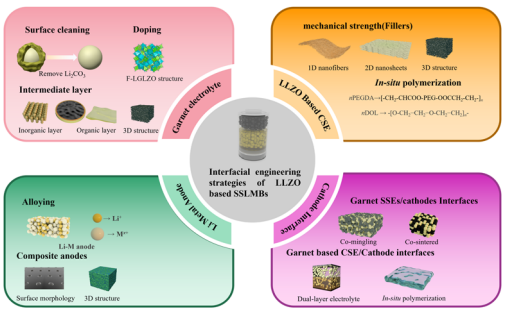


**Recent advances in garnet-based electrolytes for solid-state lithium metal batteries: interfacial challenges and engineering strategies**

Yuezhen Mao, Jilong Liu, Wei Chen, Wei Zhang and Chunwen Sun*

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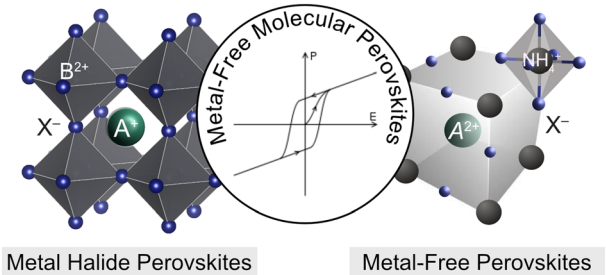


**The emergence of metal-free molecular perovskites: challenges and opportunities**

Loreta A. Muscarella,* Gianluca Bravetti and Jovana V. Milić*

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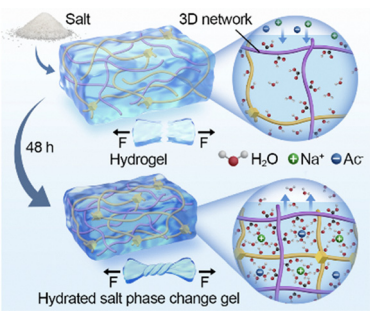


**Enhanced stimuli-responsive phase change gels through pickling-enabled ion permeation**

Peimin Yu, Xiong Wang, Ziye Ling,* Zhengguo Zhang, Steven Wang* and Xiaoming Fang*



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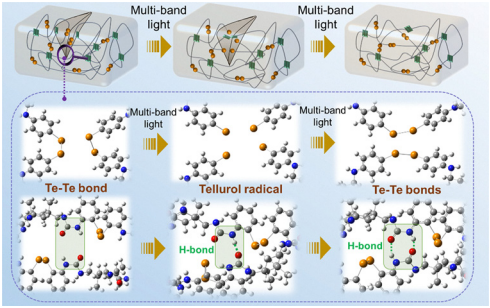
**Visible light-initiated rapid self-healing of PDMS elastomers engineered through dual dynamic bonding networks for smart sensors**

Mingfeng Dai, Xiang Han, He Zhang, Jing Yan, Ruipeng Han, Longkun Que, Yifan Guo and Zuowan Zhou*

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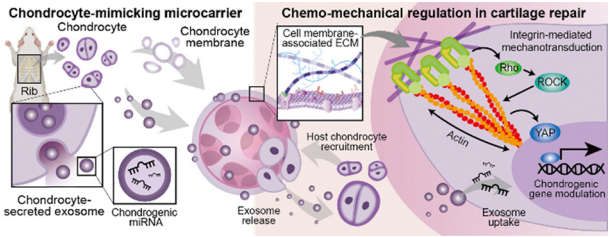
**Chondrocyte-mimetic therapeutic microcarriers for synergistic chemo-mechanical signaling in cartilage regeneration**

Na-Hyun Lee, Zechu Zhou, Ji-Young Yoon, Nandin Mandakhbayar, Cheng Ji Li, Jung-Hwan Lee, Hae-Won Kim* and Hye Sung Kim*

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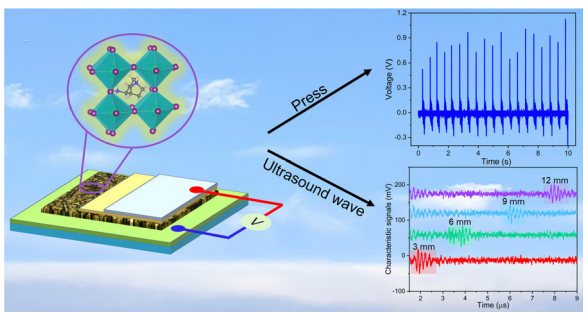
**Luminescent 3D chiral hybrid metal-halide perovskites for piezoelectric energy harvesting and ultrasound detection**

Kai Li, Zhi-Gang Li, Yong-Ji Gong,* Yong-Qiang Chen and Wei Li*

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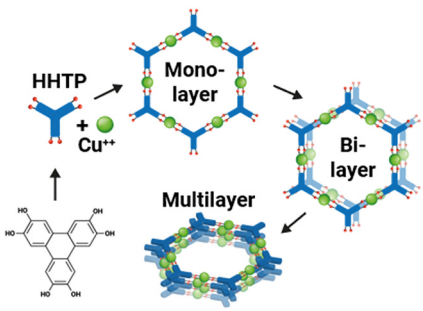
**Dirac-cone induced metallic conductivity in $Cu_3(HHTP)_2$: high-quality MOF thin films fabricated *via* ML-driven robotic synthesis**

Chatrawee Scheiger, Jonas F. Pöhls, Mersad Mostaghimi, Lena Pilz, Mariana Kozlowska, Yidong Liu, Lars Heinke, Carlos Cesar Bof Bufon, R. Thomas Weitz, Wolfgang Wenzel* and Christof Wöll*



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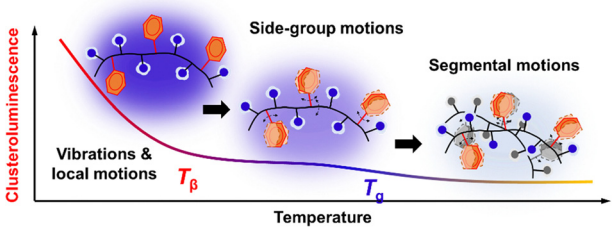


**Detection of β-transition in polyesters *via* clusteroluminescence**

Xiang Li, Xiong Liu, Yanbing Lv, Ziteng Zhang, Kailuo Chen, Bo Chu, Jing Zhi Sun, Haoke Zhang,* Xinghong Zhang* and Ben Zhong Tang*

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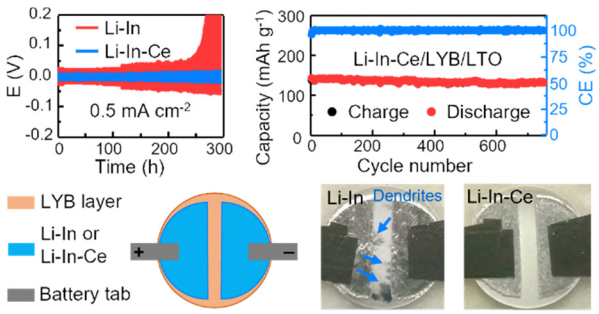


**Cerium-alloyed dendrite-inhibited highly stable anodes for all-solid-state lithium batteries**

Xiaomeng Shi, Zhichao Zeng,* Chao Li, Wenshuo Zhang, Zhiqiang Li, Guangrui Zhang, Lele Gao and Yaping Du*

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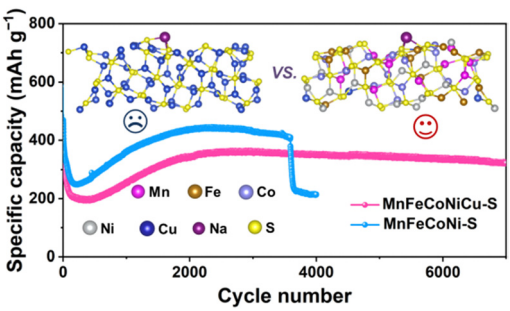


**High mixing entropy of MnFeCoNiCu–S to drive high performance sodium storage**

Wei Shuang, Junjia Xu, Fuyou Chen, Yujun Wu, Lin Yang* and Zhengyu Bai*

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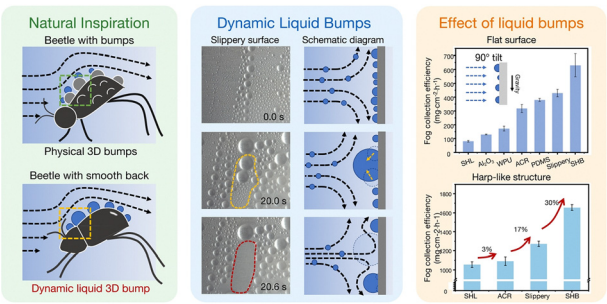


**Unravelling the aerodynamic enhancement of water harvesting *via* dynamic liquid bumps**

Haoyu Bai, He Sun, Zhihang Ye, Zhe Li, Tianhong Zhao, Xinsheng Wang, Mingren Cheng, Ziwei Wang, Shouying Huang and Moyuan Cao*



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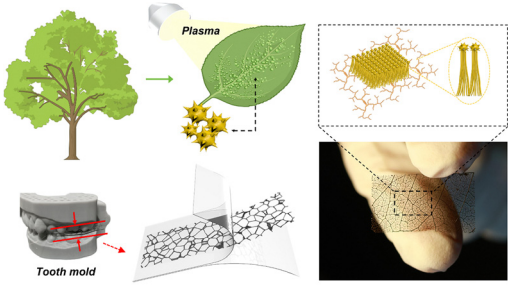
**Bioinspired leaf vein-architected gold nanowire ecoflexible biosensors for ultrasensitive occlusal force monitoring**

Wuxing Zhang, Heng Zhang, Gangsheng Chen, Biao Ma, Yang Xia and Yi Chen*




Leaf Vein-Architected Gold Nanowire Ecoflexible Biosensor

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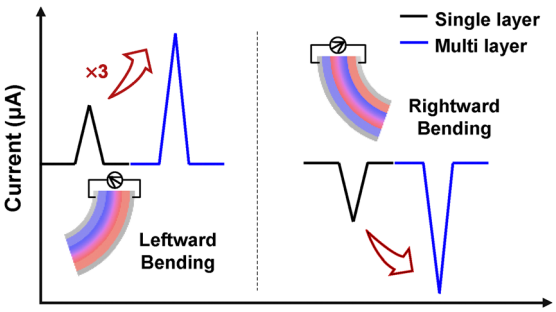
**Multilayer iontronic sensors with controlled charge gradients for high-performance, self-powered tactile sensing**

Haryeong Cho, Young-Ryul Kim, Jaehun Kim, Seungjae Lee, Seokhee Jung, Jeeyoon Kim, Jinyoung Kim, Yong-Jin Park, Sung-Phil Kim* and Hyunhyub Ko*

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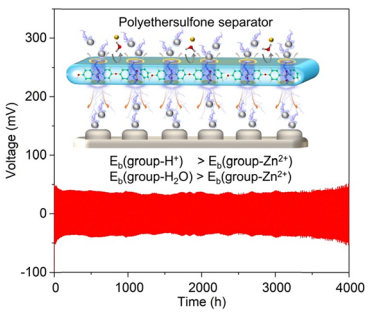
**Regulating $Zn^{2+}/H^{+}$ selectivity through functional group design of separators for long-lifespan aqueous zinc batteries**

Jiaxian Zheng, Ali Sufyan, Chong Li, Zheng Han, Xin Liu, Yuguo Zheng, J. Andreas Larsson,* Gang Huang, Binbin Wei, Zhengbing Qi, Zhoucheng Wang, Qiugen Zhang* and Hanfeng Liang*

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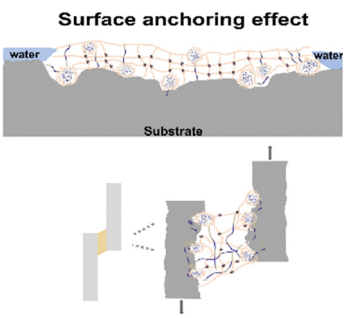
**Water-induced phase separation enables underwater adhesion far exceeding dry adhesion**

Pan Du, Yan Wang and Xianru He*



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## COMMUNICATIONS

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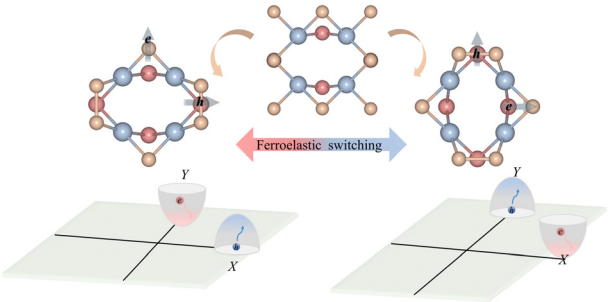


**Intrinsic ferroelastic valleytronics in 2D $Pd_4X_3Te_3$ (X = S, Se) materials: a new platform for ultrafast intervalley carrier dynamics**

Chengan Lei, Zhao Qian,* Yandong Ma and Rajeev Ahuja

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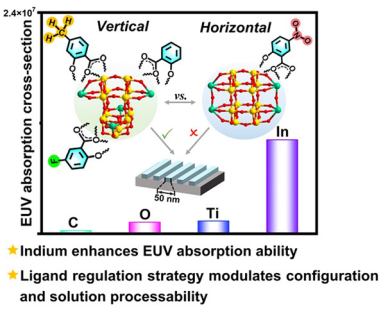


**Ligand effect on In–Ti-oxo nanoclusters for nanolithography**

Jiao Wu, Jiali Chen, Liming Wang, Yuting Ye, Xiaozhi Zhan, Yihang Song, Qiao-Hong Li, Xiaofeng Yi* and Jian Zhang*

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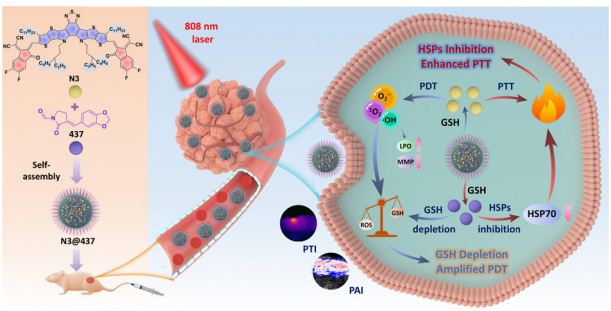


**Dual-target regulation of glutathione and heat shock proteins *via* molecular-carrier-pathway triple-engineering for potentiated phototherapy**

Yike Tu, Laiping Fang, Shufang Li, Kuo He, Yanzhao Diao, Lifeng Hang, Lina Wang, Jianan Dai,* Ping'an Ma* and Guihua Jiang*

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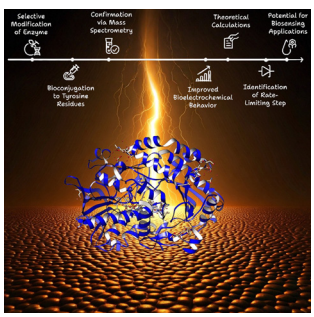


**Tyrosine-specific bioconjugation allowing hole hopping along aromatic chains of glucose oxidase**

Guoda Vecelytė, Vygailė Dudkaitė, Ondrej Šedo, Zbyněk Zdráhal and Gintautas Bagdžiūnas*



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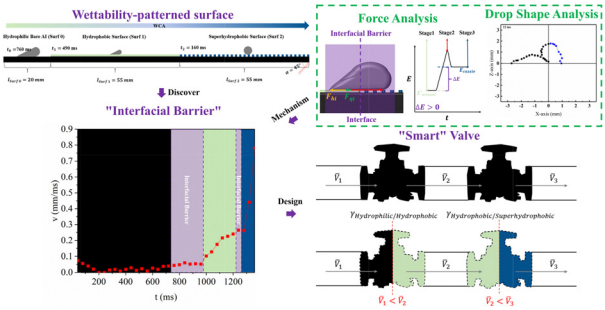
**The smart valve for micro flow-velocity regulation based on the "Interfacial Barrier" effect of wettability-patterned surfaces**

Litao Chen, Yimin Luo,* Jincheng Liu, Boran Hao, Shushen Lyu and Zhuangzhu Luo*

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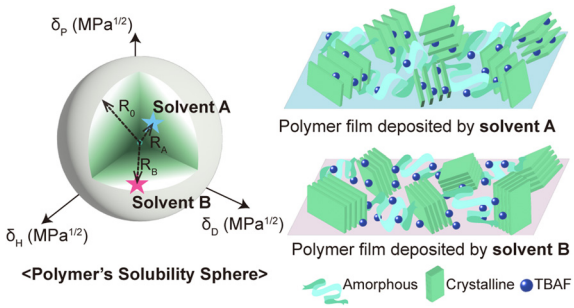
**Leveraging solvent affinity for phase-selective doping to enhance doping efficiency in a DPP-based n-type conjugated polymer**

Soyeong Jang, Osnat Zapata-Arteaga,* Diego Rosas Villalva, Guorong Ma, Andrew Bates, Anirudh Sharma, Abdul-Hamid Emwas, Yongcao Zhang, Jianhua Han, Xiaodan Gu and Derya Baran*

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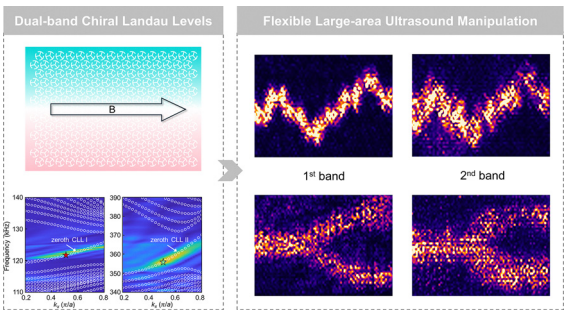
**Dual-band flexible large-area ultrasonic energy conveying *via* elastic chiral Landau levels**

Lei Fan, Zhihao Lan, Yafeng Chen, Jie Zhu and Zhongqing Su*

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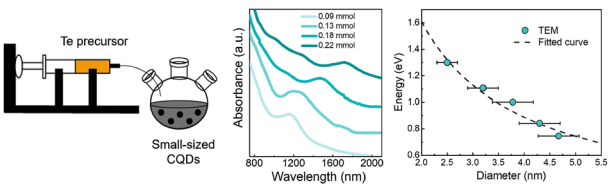
**Continuous monomer supply for highly monodisperse $Ag_2Te$ colloidal quantum dots for SWIR photodetectors**

Ha-Neul Kim, Doheon Yoo, Abhishek Sharma and Min-Jae Choi*



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## COMMUNICATIONS

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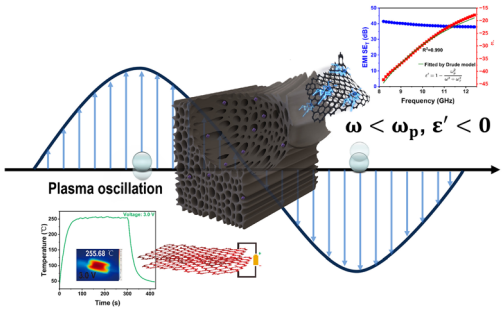


**Bio-based derived carbon materials for permittivity metamaterials: dual efficacy of electromagnetic wave protection and Joule heating**

Chenchen Wang, Xiuyi Lin, Chuanshuang Hu,* Yao Ding, Zhuoqun Wang, Yonghui Zhou,* Xi Lin and Jiangtao Xu*

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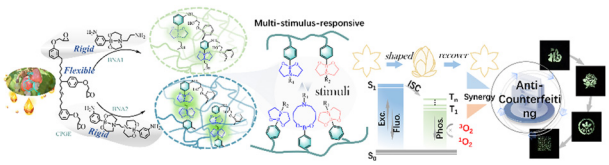


**A multifunctional cardanol-based room-temperature phosphorescent material with multi-stimulus-responsive shape-memory for anti-counterfeiting and encryption**

Caiying Bo,* Yiran Fu, Miao Li, Lihong Hu,* Meng Zhang,* Fei Song and Yonghong Zhou*

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**Scab-inspired strong adhesive tapes with self-detachment based on water-mediated destruction of polymer crystals**

Yichen Zhou, Yicheng Zhu, Xing Zhang, Ying Zheng, Junfeng Liu, Yongzhong Bao, Guorong Shan, Jinjun Yang,* Pengju Pan* and Chengtao Yu*

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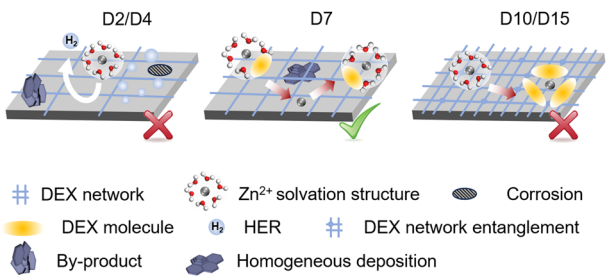


**Chain-length engineered interfacial architecture enables dendrite-free aqueous zinc-ion batteries**

Jiaqi Yang, Zhengxiao Ji, Miaoran Deng, Chaocang Weng, Xusheng Wang, Min Xu,* Likun Pan* and Jinliang Li*



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## COMMUNICATIONS

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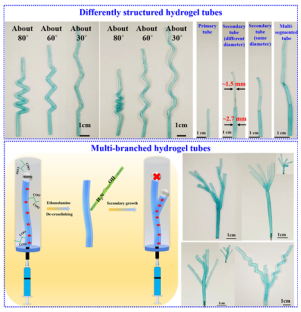
**Biomimetic differently structured and multi-branched hydrogel tubes inspired by bud-growth of plants**

Guoqiang Lu, Jingyu Jin, Yicheng Wang, Guohua Wang, Jun Nie and Xiaoqun Zhu*




## CORRECTION

6406

**Correction: Regulating $Zn^{2+}/H^{+}$ selectivity through functional group design of separators for long-lifespan aqueous zinc batteries**

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