

Materials Horizons

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See Xiaopeng Zhang *et al.*, pp. 4165–4176. Image reproduced by permission of Dalian University of Technology (Xiaopeng Zhang) from *Mater. Horiz.*, 2025, 12, 4165.



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See Xiaoyu Huang, Rongmin Qiu, Jun Luo *et al.*, pp. 4177–4192. Image reproduced by permission of Jun Luo, Rongmin Qiu, Xiaoyu Huang from *Mater. Horiz.*, 2025, 12, 4177.

EDITORIAL

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Materials Horizons 2024 Outstanding Paper Award

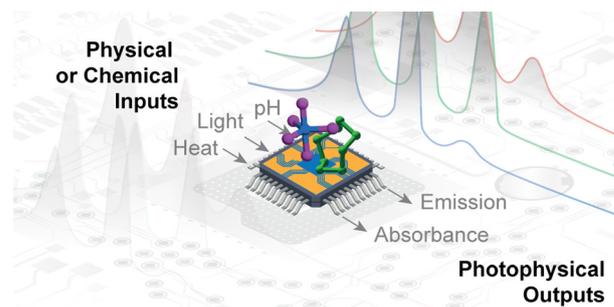


FOCUS

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Enlightening molecular logic: basics, tools and techniques for newcomers

Carlos D. S. Brites



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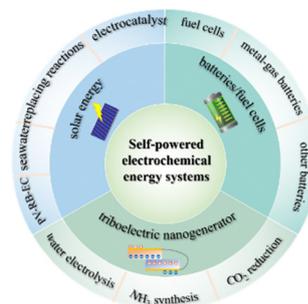
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REVIEWS

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Self-powered electrochemical energy systems to produce fuels

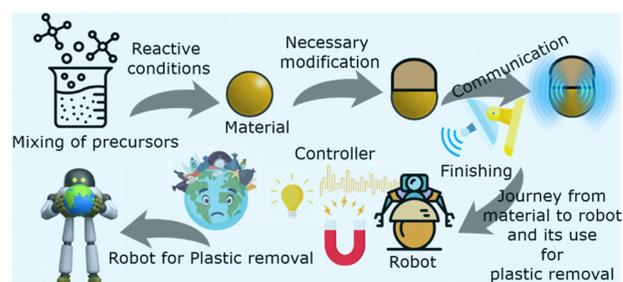
Hui Zhao* and Zhong-Yong Yuan*



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Innovative materials that behave like robots to combat plastic pollution

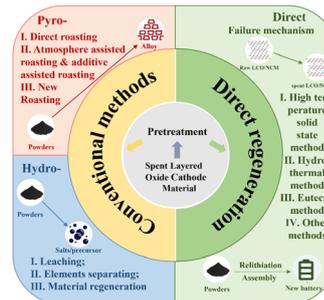
Shafqat Ali, Muhammad Haris Khan, Zareen Zuhra* and Jinfeng Wang*



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Recycling and regeneration of failed layered oxide cathode materials for lithium-ion batteries

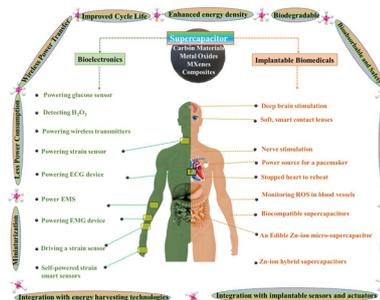
Changhao Li, Weihao Zeng,* Juan Wang, Zhongpeng Li, Jin Zhang, Xuanpeng Wang and Shichun Mu*



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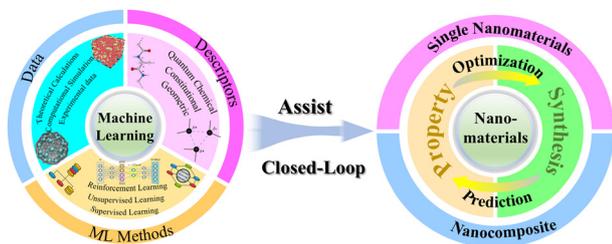
A review on electrode materials of supercapacitors used in wearable bioelectronics and implantable biomedical applications

Chandu V. V. Muralee Gopi, Salem Alzahmi, Venkatesha Narayanaswamy, K. V. G. Raghavendra, Bashar Issa* and Ihab M. Obaidat*



REVIEWS

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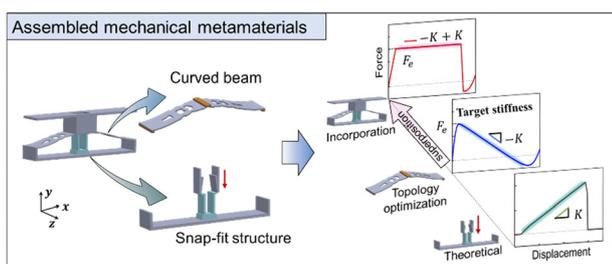


From synthesis to properties: expanding the horizons of machine learning in nanomaterials research

Shanhui Diao, Qiong Wu,* Shimei Li, Guochen Xu, Xiangling Ren, Longfei Tan, Guihua Jiang,* Peng Song and Xianwei Meng*

COMMUNICATIONS

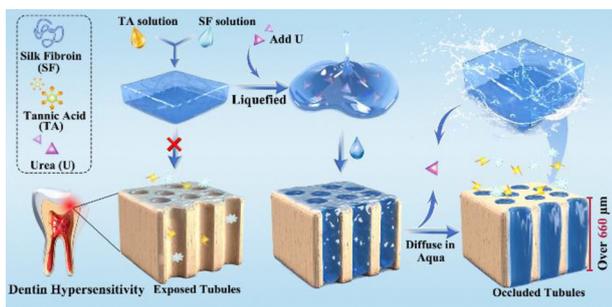
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Ideal energy-absorbing metamaterials based on self-locking bistable structures

Kuan Liang, Xiaopeng Zhang,* Qi Zhao, Liujia Suo, Zishen Wei, Yaguang Wang, Yangjun Luo, Akihiro Takezawa and Dazhi Wang

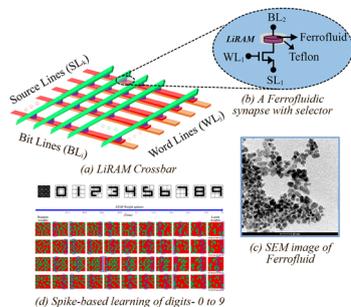
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A silk fibroin-based hydrogel desensitizer achieving 660 μm dentin tubule occlusion for dentin hypersensitivity treatment

Kuangdi Xin, Wanshan Gao, Yulu Xie, Xiaohua Dong, Lingshan Ran, Tianyi Xia, Jing Xie, Jiaojiao Yang, Tao Hu, Jianshu Li, Xiaoyu Huang,* Rongmin Qiu* and Jun Luo*

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Liquid ferrofluid synapses for spike-based neuromorphic learning

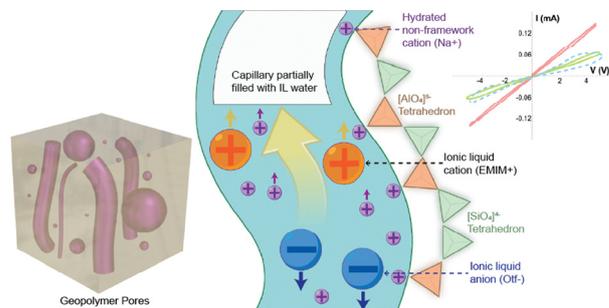
Charanraj Mohan, Marco Crepaldi, Diego Torazza, Andrew Adamatzky, Gisy Abd, Aleksandra Szkudlarek and Alessandro Chiolerio*



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Scaled-down ionic liquid-functionalized geopolymer memristors

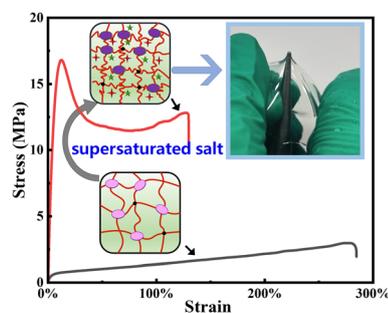
Maedeh Ahmadipour, Mahmudul Alam Shakib, Zhaolin Gao, Stephen A. Sarles,* Caterina Lamuta* and Reza Montazami*



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Puncture-resistant hydrogels with high mechanical performance achieved by the supersaturated salt

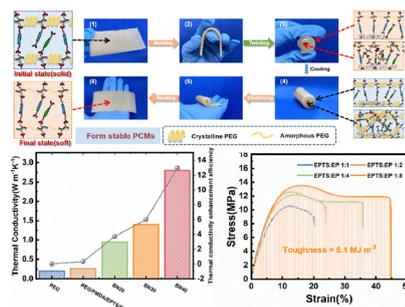
Bo Tang, Jian Hu, Zijian Zhao, Shuo Li, Hongying Lv* and Xiaoni Yang



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Tough and sustainable solid–solid phase change materials achieved *via* reversible crosslinking for thermal management

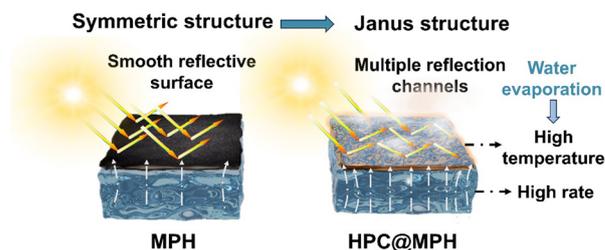
Fubin Luo,* Yaofei Xu, Dongliang Wang, Lebin Zhan, Yixin Feng, Bili Lin, Chunrui Zhai and Hongzhou Li



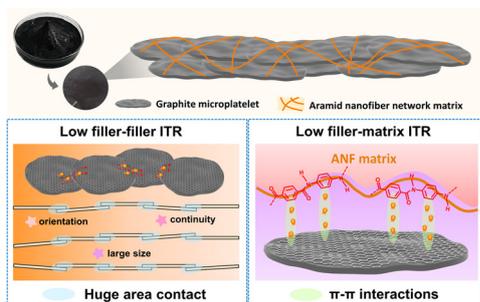
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Highly salt-resistant and efficient dynamic Janus absorber based on thermo-responsive hydroxypropyl cellulose

Jianfeng Gu, Zhaohui Luan, Xinmin Zhang, Huihui Wang, Xu Cai, Weiqing Zhan, Xinyi Ji* and Jiajie Liang*



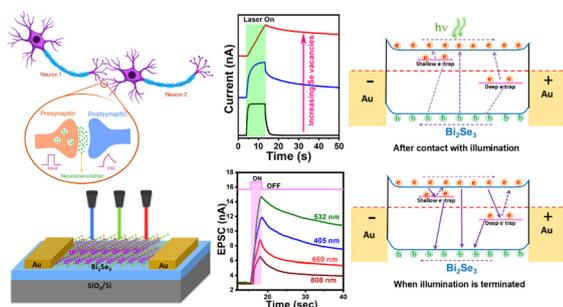
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Ultra-high thermally conductive graphite microplatelet/aramid nanofiber composites with reduced interfacial thermal resistances by engineered interface π - π interactions

Yu-Yang Song, Niu Jiang, Shuang-Zhu Li, Lu-Ning Wang, Lu Bai, Jie Yang* and Wei Yang*

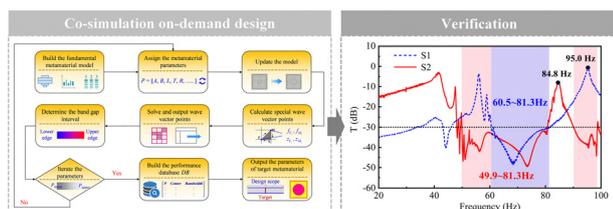
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Defect-engineered 2D Bi_2Se_3 -based broadband optoelectronic synapses with ultralow energy consumption for neuromorphic computing

Sanju Nandi, Sirsendu Ghosal, M. Meyyappan and P. K. Giri*

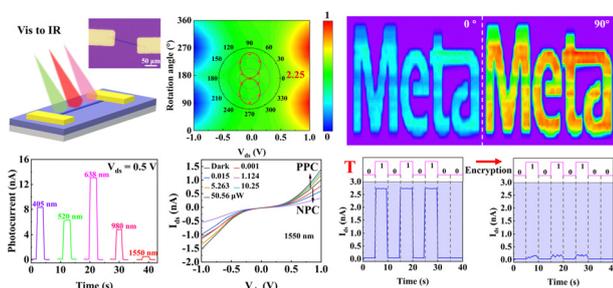
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On-demand design for elastic metamaterial based on a semi-analytical band gap rapid extraction method

Xingzhong Wang, Zhibin Liang, Zhengqing Tang, Shiteng Rui, Kaifu Li and Fuyin Ma*

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A broadband polarization-sensitive photodetector and an infrared encoder based on high crystallinity 1D $\text{Bi}_2(\text{Se}_x\text{S}_{1-x})_3$ ternary nanowires

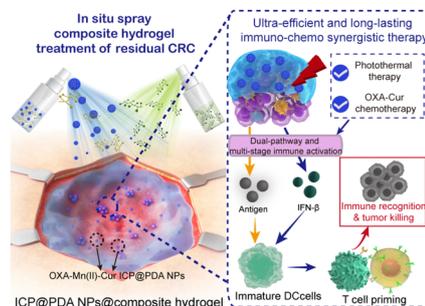
Yu Zhang, Wenhao Fan, Weijie Bai, Wei Yan, Xinjian Liu, Yanxia Li, Mengyang Li, Jiayu Zhao, Jin Zhang, Shougen Yin and Hui Yan*



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Sprayed hyaluronic acid based multidrug composite hydrogel for postoperative colorectal cancer ultra-efficient long-lasting multi-stage immuno-chemo synergistic therapy

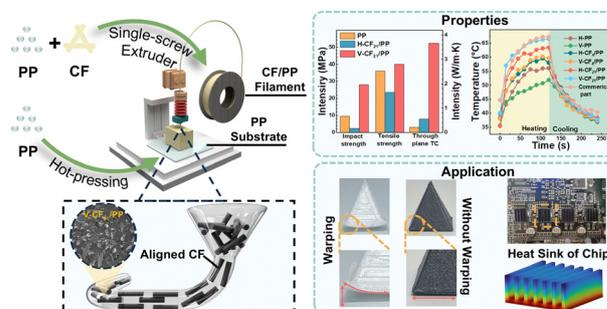
Ya Wang, Xiaojiang Zhang, Yujie Zhang, Feiyu Shi, Siyuan Du, Zhe Zhang, Chenyu Zhao, Siyuan Luo, Pengqian Wang,* Daocheng Wu* and Junjun She*



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Structuring 3D-printed polypropylene composites with vertically aligned mesophase pitch-based carbon fibers for enhanced through-plane thermal conductivity and mechanical properties

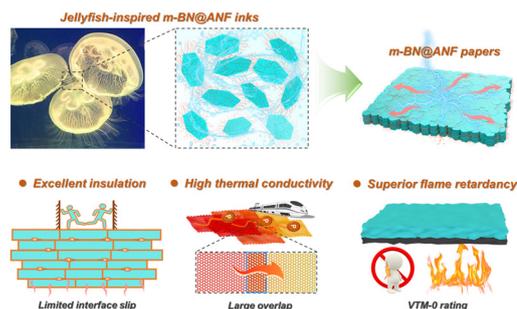
Bowen Fang, Yan Wang,* Hongjia Fan, Yumei Gong, Jing Guo, Zhiguo Wang, Jiazhuang Xu* and Shengfa Wang



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Scalable assembly of micron boron nitride into high-temperature-resistant insulating papers with superior thermal conductivity

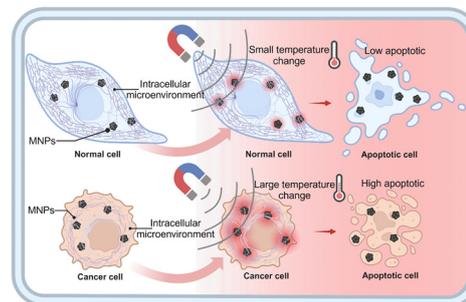
Meng-Xin Liu, Rui-Yu Ma, Zhi-Xing Wang, Zhuo-Yang Li, Gui-Lin Song, Jie Lin, Xin-Yuan Li, Ling Xu,* Ding-Xiang Yan, Li-Chuan Jia* and Zhong-Ming Li



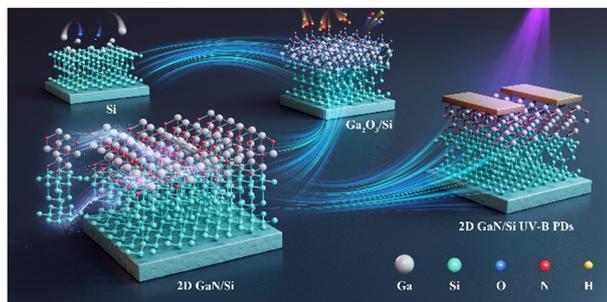
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Differential intracellular influence of cancer cells and normal cells on magnetothermal properties and magnetic hyperthermal effects of magnetic nanoparticles

Man Wang, Rui Sun, Huajian Chen, Toru Yoshitomi, Hiroaki Mamiya, Masaki Takeguchi, Naoki Kawazoe, Yingnan Yang and Guoping Chen*



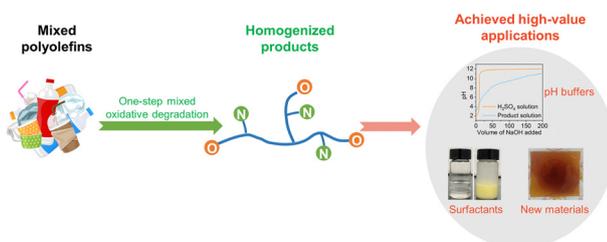
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Two-dimensional GaN/Si heterojunctions towards high-performance UV-B photodetectors

Hongsheng Jiang, Haiyan Wang, Wenliang Wang* and Guoqiang Li*

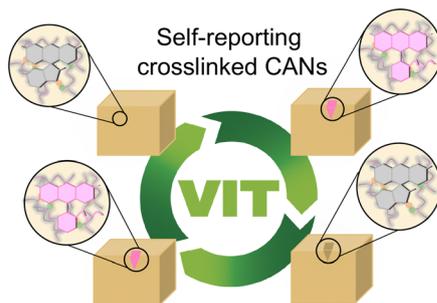
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Highly adaptable oxidative upcycling of polyolefins to multifunctional chemicals containing oxygen and nitrogen

Xiangyue Wei, Chengfeng Shen, Pengbo Ye, Xuehui Liu, Shimei Xu* and Yu-Zhong Wang*

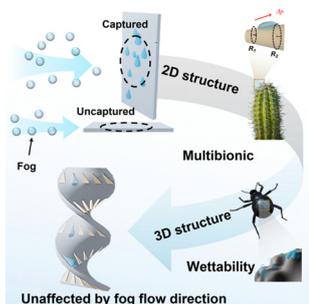
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Dynamically crosslinked polyethylene-like materials with reversible self-reporting properties

Alessandro Torri, Chiara Paravidino, Gabriele Giovanardi, Francesco Rispoli, Fabrizio Moroni, Alessandro Pedrini, Enrico Dalcanale, Alberto Fina* and Roberta Pinalli*

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Efficient direction-independent 3D spiral fog collector

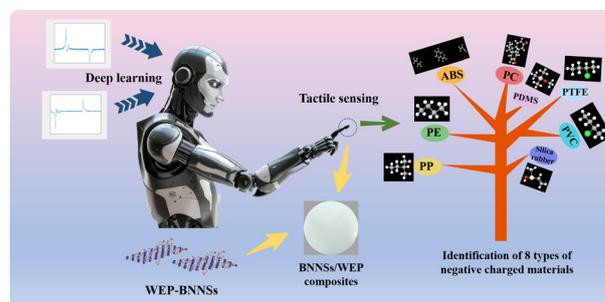
Yihang Zhang, Liubin Li, Yuxuan He, Huayang Zhang, Shanpeng Li and Zhiguang Guo*



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A high recognition accuracy tactile sensor based on boron nitride nanosheets/epoxy composites for material identification

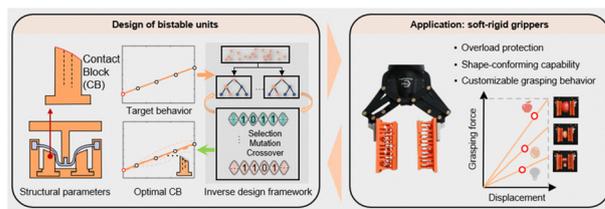
Shufen Wang,* Mengyu Li, Hailing Xiang, Wenlong Chen, Ruping Xie, Zhixiong Lin, Konghong Hu, Ning Zhang* and Chengmei Gui*



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Customizable bistable units for soft-rigid grippers enable handling of multi-feature objects via data-driven design

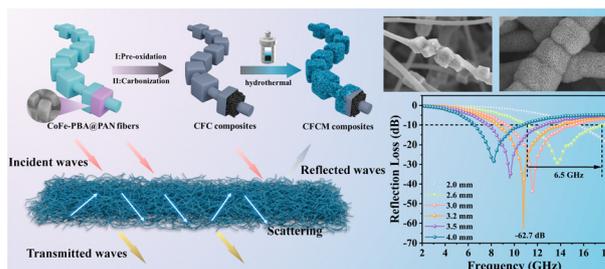
Jian He, Yaohui Wang, Hubocheng Tang, Guoquan Zhang, Ke Dong, Dong Wang, Liang Xia* and Yi Xiong*



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MnO₂-coated necklace-like CoFe@carbon nanofiber composites for superior electromagnetic wave absorption

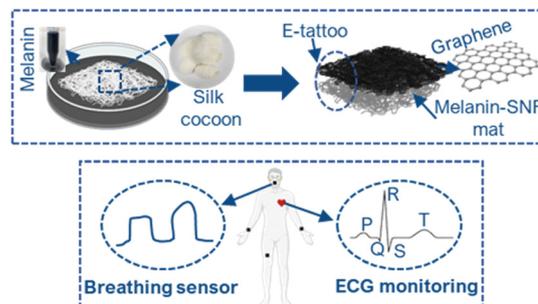
Yiliang Liu, Ying Lin,* Zhixin Cai, Yongzhen Ma, Hongwei Zhou, Wei Chai, Qibin Yuan and Haibo Yang*



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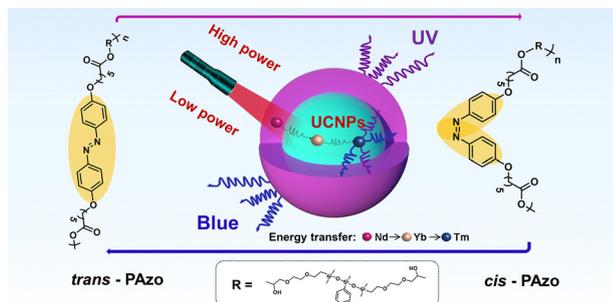
Semiconducting and environmentally responsive melanin-doped silk nanofibers for multifunctional electronic tattoos

Shalik Ram Joshi, Soohoon Lee and Sunghwan Kim*



COMMUNICATIONS

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A near-infrared light-driven composite for smart and robust adhesion based on dynamic photochemistry

Yuxian Su, Tianfu Song,* Li Liu* and Shipeng Wen*

CORRECTION

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Correction: A flexible dual-mode sensor with decoupled strain and temperature sensing for smart robots

Shiyong Li, Mengyu Yang, Yuanzhao Wu,* Waqas Asghar, Xingjian Lu, Haifeng Zhang, Enhong Cui, Zaojun Fang, Jie Shang, Yiwei Liu* and Run-Wei Li*

