Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

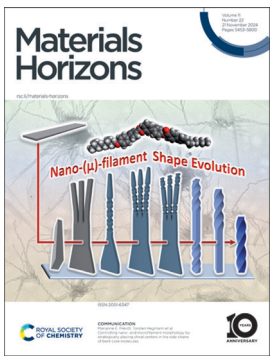
Materials Horizons

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(22) 5453–5800 (2024)



Cover
See Marianne E. Prévôt, Torsten Hegmann *et al.*, pp. 5550–5563.
Image reproduced by permission of Grace A. R. Rohaley and Torsten Hegmann from *Mater. Horiz.*, 2024, **11**, 5550.

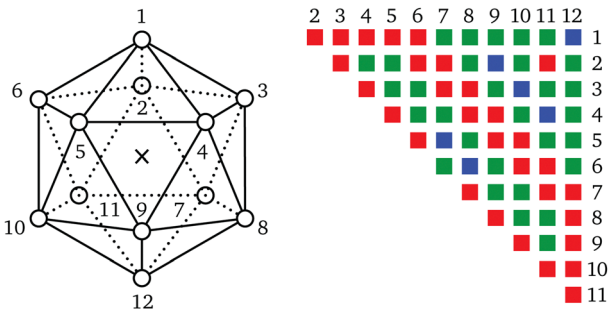
Inside cover
See Zhengbao Zha *et al.*, pp. 5564–5577.
Image reproduced by permission of Zhengbao Zha from *Mater. Horiz.*, 2024, **11**, 5564.

FOCUS

5464

Towards an information-based theory of structure

Glenn D. Hibbard and John Çamkıran

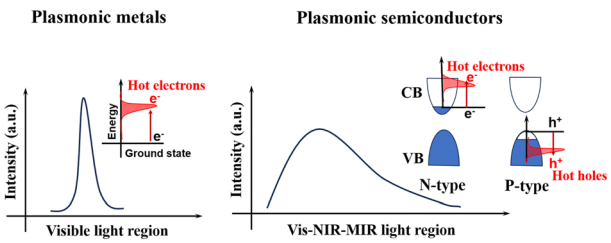


REVIEWS

5470

Full-spectrum plasmonic semiconductors for photocatalysis

Xiaolei Liu, Baibiao Huang, Juan Li,* Baojun Li and Zaizhu Lou*



Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

ROYAL SOCIETY OF CHEMISTRY

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

Registered charity number: 207890

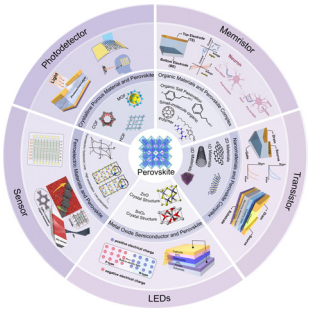
Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

REVIEWS

5499

Recent advances in artificial neuromorphic applications based on perovskite composites

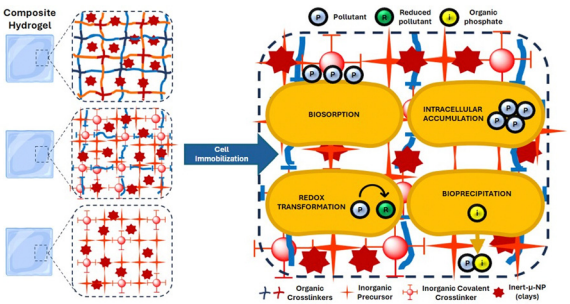
Huaxin Li, Qingxiu Li, Tao Sun, Ye Zhou and Su-Ting Han*



5533

Clay–polymer hybrid hydrogels in the vanguard of technological innovations for bioremediation, metal biorecovery, and diverse applications

Miguel A. Ruiz-Fresneda,* Eduardo González-Morales, Cristina Gila-Vilchez, Alberto Leon-Cecilla, Mohamed L. Merroun, Antonio L. Medina-Castillo and Modesto T. Lopez-Lopez

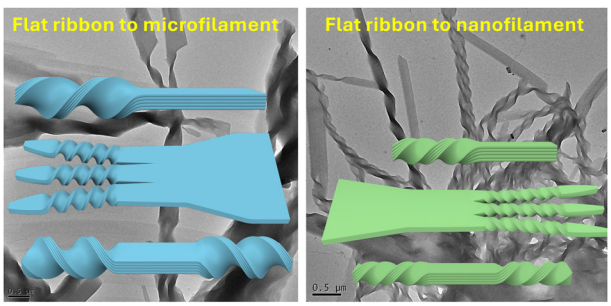


COMMUNICATIONS

5550

Controlling nano- and microfilament morphology by strategically placing chiral centers in the side chains of bent-core molecules

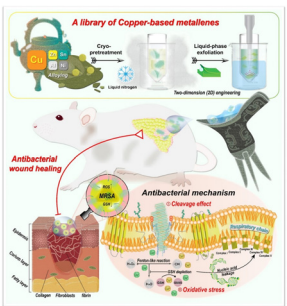
Ashwathanarayana Gowda, Gourab Acharjee, Suraj Kumar Pathak, Grace A. R. Rohaley, Asmita Shah, Robert P. Lemieux, Marianne E. Prévôt* and Torsten Hegmann*



5564

A small library of copper-based metallenes with superior antibacterial activity

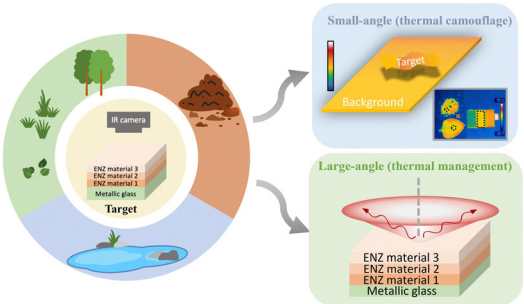
Zhaohua Miao, Chenxin Lu, Cheng-Yan Xu, Yan Ma, Zhong Cao, Lulu Liu, Deyan Gong and Zhengbao Zha*



Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

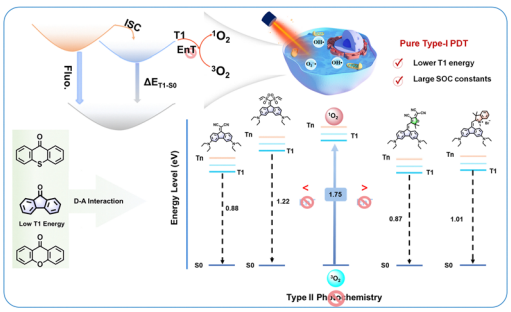
5578



Epsilon-near-zero thin films in a dual-functional system for thermal infrared camouflage and thermal management within the atmospheric window

Pei-Chi Hsieh, Sih-Wei Chang, Wei-Hsuan Kung, Tzu-Chieh Hsiao and Hsuen-Li Chen*

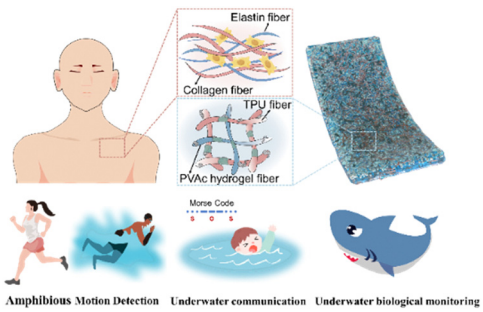
5589



***De novo* design of type-I photosensitizer agents based on structure-inherent low triplet energy for hypoxia photodynamic therapy**

Xiao-Yun Ran, Wen-Li Xia, Li-Na Zhang, Xiao-Qi Yu, Ping Chen, Kun-Peng Xie, Yu Zhao, Cheng Yi and Kun Li*

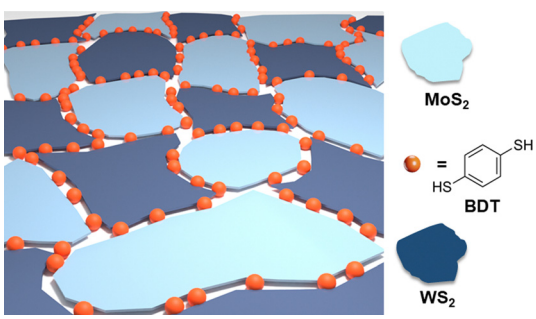
5600



Strong and anti-swelling nanofibrous hydrogel composites inspired by biological tissue for amphibious motion sensors

Zheng Ren, Fang Guo, Yong Wen, Yang Yang, Jinxin Liu and Si Cheng*

5614



Defect-engineering of liquid-phase exfoliated 2D semiconductors: stepwise covalent growth of electronic lateral hetero-networks

Antonio Gaetano Ricciardulli, Christopher E. Petoukhoff, Anna Zhuravlova, Adam G. Kelly, Chun Ma, Frédéric Laquai, Jonathan N. Coleman and Paolo Samori*

This journal is © The Royal Society of Chemistry 2024

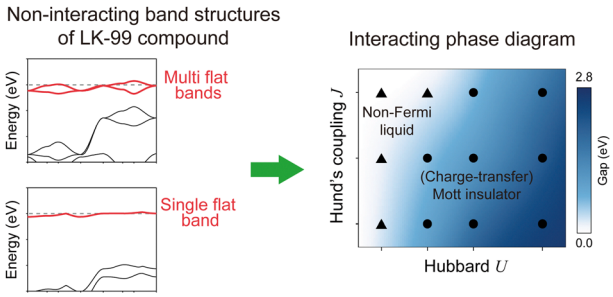
Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

5622

Non-Fermi liquid to charge-transfer Mott insulator in flat bands of copper-doped lead apatite

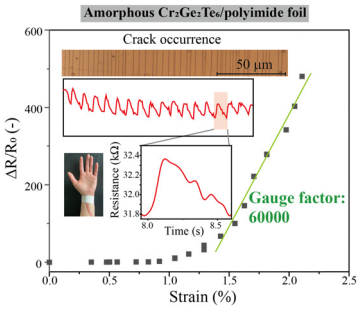
Sun-Woo Kim,* Kristjan Haule, Gheorghe Lucian Pascut* and Bartomeu Monserrat*



5631

An amorphous $Cr_2Ge_2Te_6$/polyimide double-layer foil with an extraordinarily outstanding strain sensing ability

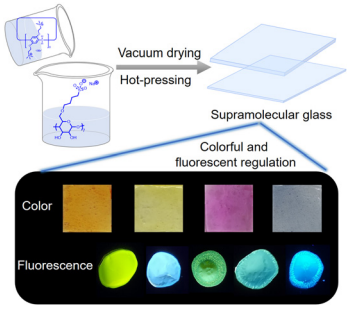
Yinli Wang, Yi Shuang, Mihyeon Kim, Daisuke Ando, Fumio Narita and Yuji Sutou*



5641

Supramolecular control over the variability of color and fluorescence in low-molecular-weight glass

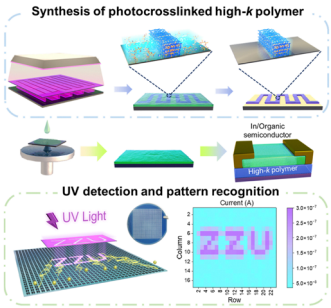
Yunfei Zhang, Changyong Cai, Fenfang Li, Xin Tan, Qing Li,* Xinlong Ni* and Shengyi Dong*



5650

Solution-processed high-*k* photopatternable polymers for low-voltage electronics

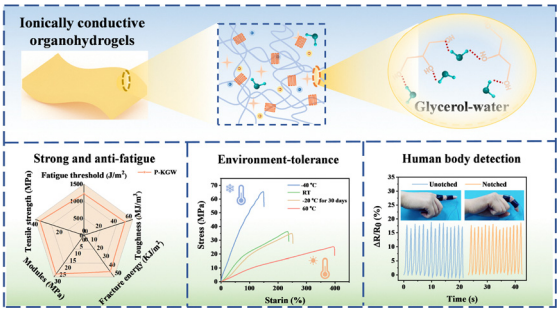
Qingqing Sun, Hongwei Ge, Shuai Wang, Xiaohang Zhang, Juzhong Zhang, Shisheng Li, Zhiqiang Yao, Lei Zhang and Xuying Liu*



Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

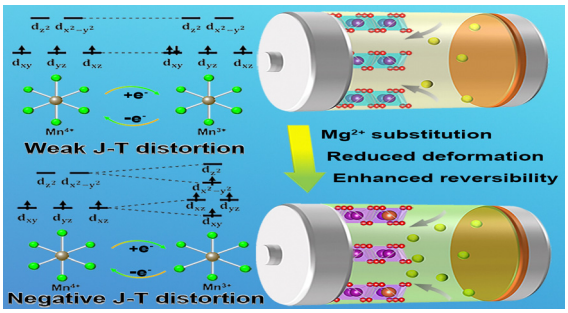
5662



Strong, tough and environment-tolerant organohydrogels for flaw-insensitive strain sensing

Yuqing Wang, Zhanqi Liu, Yuntao Liu, Jun Yan, Haidi Wu, Hechuan Zhang, Huamin Li, Junjie Wang, Huaiguo Xue, Ling Wang, Yongqian Shi, Longcheng Tang, Pingan Song and Jiefeng Gao*

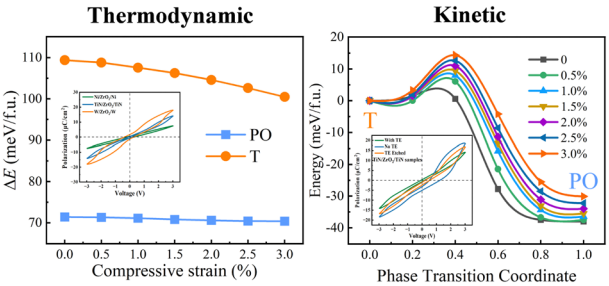
5674



Inducing weak and negative Jahn–Teller distortions to alleviate structural deformations for stable sodium storage

Zishan Hou, Yuanming Liu, Shuyun Yao, Shiyu Wang, Yingjie Ji, Weijie Fu, Jiangzhou Xie, Yi-Ming Yan and Zhiyu Yang*

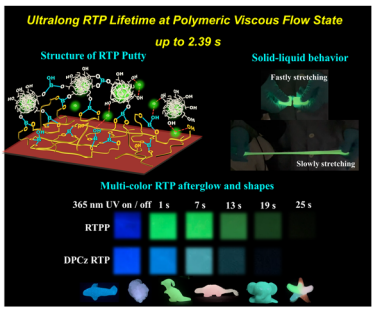
5684



The contradiction between thermodynamic and kinetic effects of stress-modulated antiferroelectricity in ZrO_2 thin films

Qisheng He, Tao Yu, Binjian Zeng,* Puqi Hao, Shuaizhi Zheng, Qiangxiang Peng, Yichun Zhou and Min Liao*

5692



Ultralong room temperature phosphorescence with multicolor afterglow achieved in a harsh polymeric viscous flow state

Shiyu Gu, Qi Wu* and Jinrong Wu*

This journal is © The Royal Society of Chemistry 2024

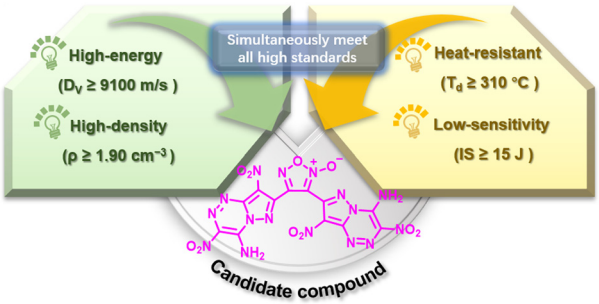
Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

5701

An advanced furoxan-bridged heat-resistant explosive

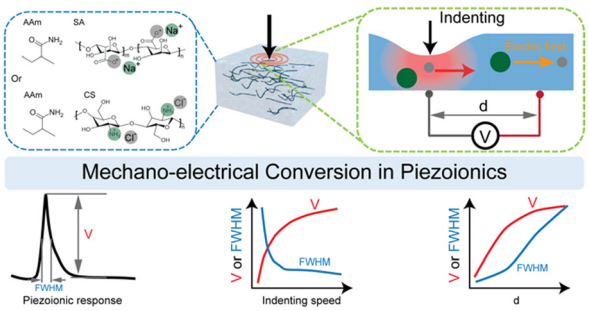
Chengchuang Li, Teng Zhu, Jie Tang, Caijin Lei, Guoyang Yu, Yanqiang Yang, Hongwei Yang,* Chuan Xiao* and Guangbin Cheng*



5709

A universal framework for determining the effect of operating parameters on piezoionic voltage generation

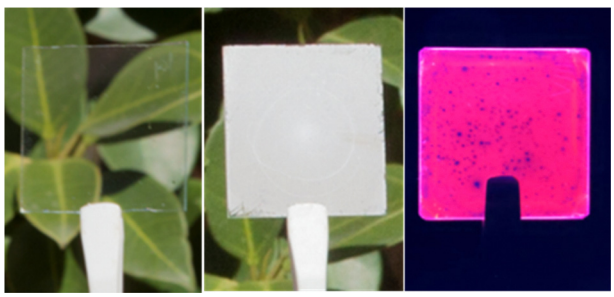
Jiangang Xu, Qiang Li and Derek Ho*



5722

Transparent porous films with real refractive index close to unity for photonic applications

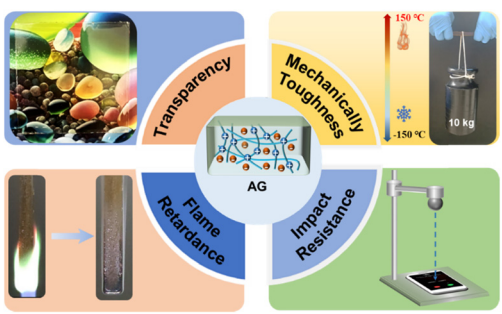
José M. Miranda-Muñoz, José M. Viaña, Mauricio E. Calvo, Gabriel Lozano* and Hernán Míguez*



5732

Optically transparent and mechanically tough glass with impact resistance and flame retardancy enabled by covalent/supramolecular interactions

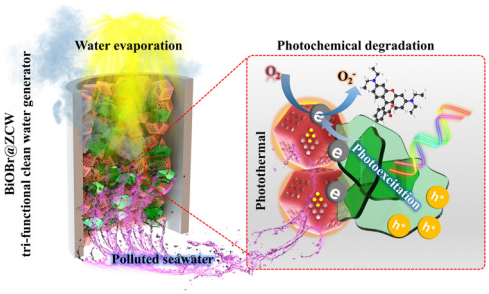
Changyong Cai, Guohong Yao, Yunfei Zhang, Shiguo Zhang, Fenfang Li, Zhijian Tan* and Shengyi Dong*



Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

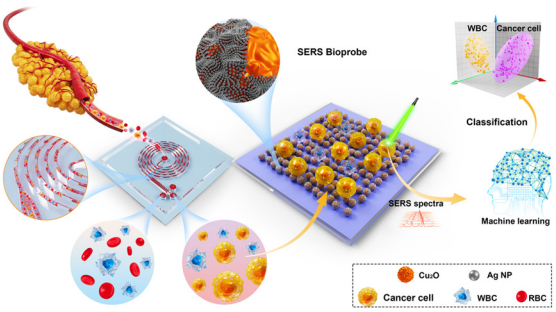
5740



Efficient solar-driven freshwater generation through an inner hierarchical porous metal–carbon layer bridging synergistic photothermal evaporation and adsorption photodegradation

Haoyu Liu, Huaipeng Pang, Xinyu Yang, Wenhao Guo, Hongyan Xi, Xueli Ji, Lin Li and Fanlu Meng*

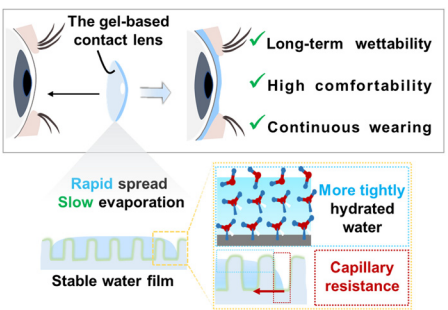
5752



Precise diagnosis of tumor cells and hemocytes using ultrasensitive, stable, selective cuprous oxide composite SERS bioprobes assisted with high-efficiency separation microfluidic chips

Yujiao Xie, Lei Xu, Jiahao Zhang, Chenguang Zhang, Yue Hu, Zhouxu Zhang, Guoxin Chen, Shuyan Qi, Xiawei Xu, Jing Wang, Wenzhi Ren, Jie Lin* and Aiguo Wu*

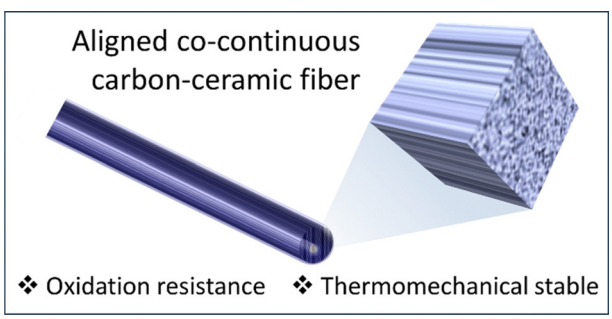
5768



Rapid spread, slow evaporation: a long-lasting water film on hydrogel nanowire arrays for continuous wearables

Peijia Li, Yilin Wang, Ming Qiu, Yixiao Wang, Zhaoxiang Lu, Jianning Yu, Fan Xia, Yun Feng* and Ye Tian*

5777



Synergistic enhancement of thermomechanical properties and oxidation resistance in aligned Co-continuous carbon–ceramic hybrid fibers

Jakob Denk, Xiaojian Liao,* Martin Dulle, Stefan Schafföner, Stephan Förster, Andreas Greiner, Günter Motz* and Seema Agarwal*

This journal is © The Royal Society of Chemistry 2024

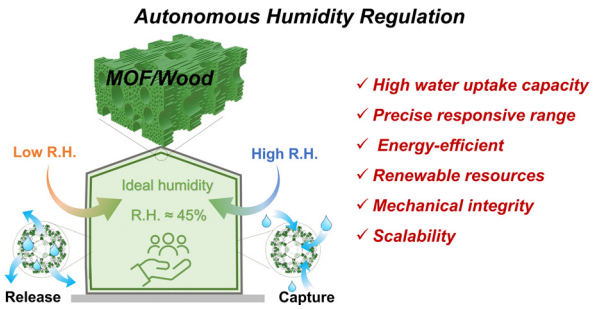
Open Access Article. Published on 11 November 2024. Downloaded on 1/30/2026 12:48:08 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

5786

Autonomous humidity regulation by MOF/wood composites

Kunkun Tu, Zhidong Zhang, Christopher H. Dreimol, Roman Günther, Robert Zboray, Tobias Keplinger, Ingo Burgert and Yong Ding*



CORRECTION

5798

Correction: An amorphous $Cr_2Ge_2Te_6$/polyimide double-layer foil with an extraordinarily outstanding strain sensing ability

Yinli Wang, Yi Shuang, Mihyeon Kim, Daisuke Ando, Fumio Narita and Yuji Sutou*