

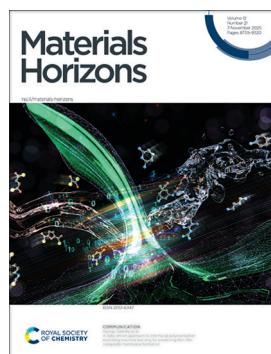
Materials Horizons

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ISSN 2051-6347 CODEN MHAOAL 12(21) 8759-9320 (2025)



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See Gyorgy Szekely *et al.*, pp. 9009–9025. Image reproduced by permission of Gyorgy Szekely, KAUST from *Mater. Horiz.*, 2025, 12, 9009.



Inside cover

See Timo Jacob, Hagar K. Hassan *et al.*, pp. 9026–9039. Image reproduced by permission of Hagar K. Hassan and Timo Jacob from *Mater. Horiz.*, 2025, 12, 9026.

EDITORIAL

8772

Materials Horizons Emerging Investigator Series:
Dr Hua Bing Tao, Xiamen University, China

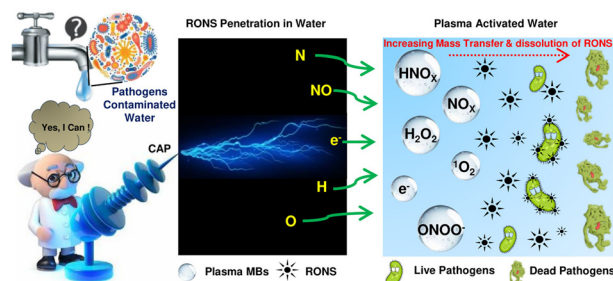


REVIEWS

8774

Microbubble-enhanced cold plasma (MB-CAP) for pathogen disinfection in water: a sustainable alternative to traditional methods

Muzammil Kuddushi,* Parin Dal, Chen Xiaoyun, Qian Xincong, Jiayue Luo, Huihui Gan,* Dingnan Lu* and David Z. Zhu



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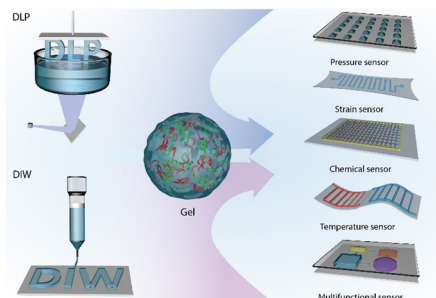
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REVIEWS

8802

Recent progress of 3D-printed polymeric gel sensors for flexible electronics

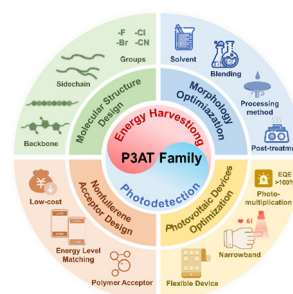
Lei Cui, Yuxuan Lin, Chenning Li, Zhenhua Yang, Chao-Peng Wang, Jun Yin* and Jian Zhu*



8832

Cost-effective poly(3-alkylthiophene)-based organic photovoltaics: advancing solar energy conversion and photodetection technologies

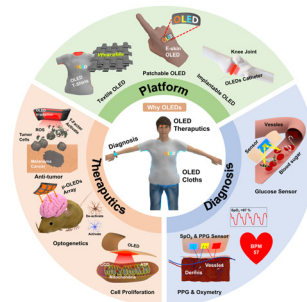
Kai Zhang, Mengyuan Gao, Junjiang Wu, Chunlong Sun, Wenchao Zhao, Diyora Urazkulova, Vakhobjon Kuvondikov, Sherzod Nematov and Long Ye*



8862

Recent advances in flexible and wearable OLEDs for biomedical applications: a review

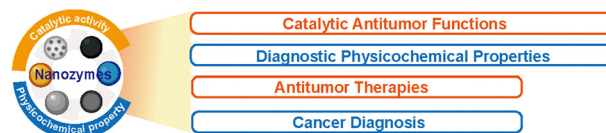
Eun Hae Cho, Young Woo Kim, Junhee Sim, Hyejeong Yeon, Sooyeon Baek, Seung Min Jeong, Junwoo Lee, Yongmin Jeon* and Kyung Cheol Choi*



8895

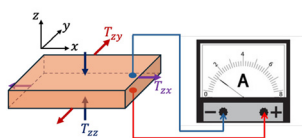
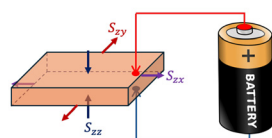
Nanozyme-enabled cancer theranostics: bridging enzyme mimicry and material intelligence

Yupeng Wang, Xinxin Sun, Shunfeng Wang, Zhixiao Zhang, Jin Sun, Cong Luo, Zhonggui He* and Shenwu Zhang*

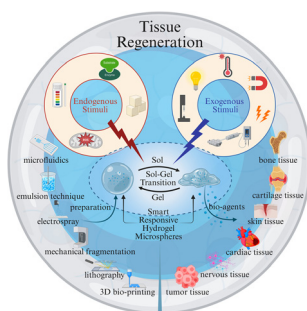


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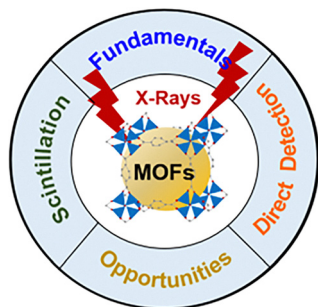
8920

Direct piezoelectric effectInput: Mechanical stress (T_{xx} , T_{xy} and T_{zz})
Output: Electric current**Converse piezoelectric effect**Input: Voltage
Output: Mechanical strain (S_{xx} , S_{xy} and S_{zz})**From solid to liquid piezoelectric materials**Minakshi Gill, Marcell Tibor Máthé, Péter Salamon,
James T. Gleeson and Antal Jákli*

8943

**Recent advances in smart responsive hydrogel microspheres for tissue regeneration: preparation, characteristics and applications**Zijian Wu, Guang Shi, Luhao Li, Zhenzhou Piao,
Junwu Wang, Renxin Chen, Zhuowen Hao,
Zheyuan Zhang, Zouwei Li, Yilong Huang and
Jingfeng Li*

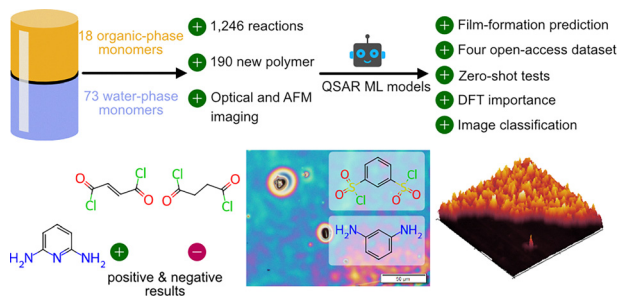
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**Metal-organic frameworks as potential materials for X-ray detectors: recent progress and unique opportunities**

Hayden Salway, Xian Wei Chua and Miguel Anaya*

COMMUNICATIONS

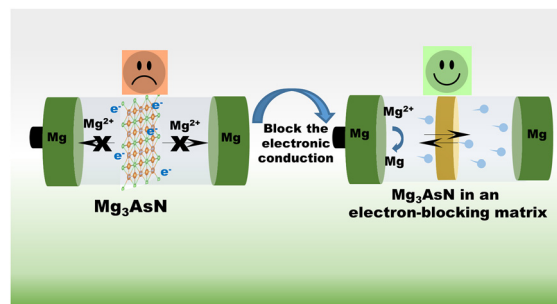
9009

**A data-driven approach to interfacial polymerization exploiting machine learning for predicting thin-film composite membrane formation**Gergo Ignacz, Muhammad Irshad Baig,
Karuppasamy Gopalsamy, Andres Villa, Suzana Nunes,
Bernard Ghanem, Tejus Shastry, Sanat K. Kumar and
Gyorgy Szekely*

9026

Is Mg_3AsN antiperovskite a promising Mg-ion conductor?

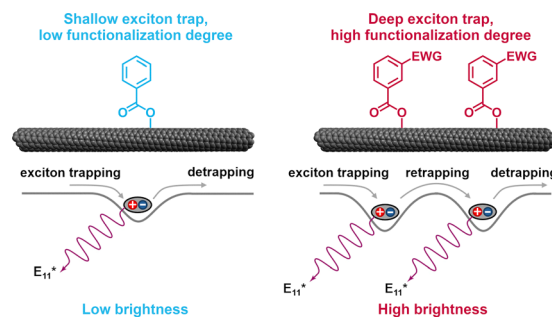
Paul Hoffmann, D. Iván Villalva-Mejorada, Omar W. Elkhafif, Thomas Diemant, Timo Jacob* and Hagar K. Hassan*



9040

Programming optical properties of single-walled carbon nanotubes with benzoyl peroxide derivatives of tailored chemical characteristics

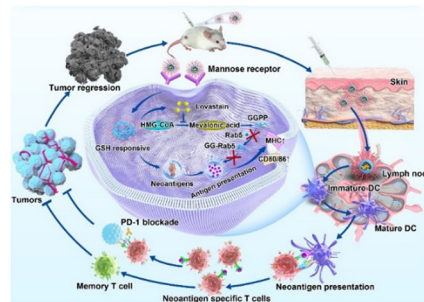
Andrzej Dzienia,* Patrycja Taborowska, Paweł Kubica-Cypek and Dawid Janas*



9057

Lymph node-targeted metabolic regulatory nanovaccines to boost cancer immunotherapy by potentiating dendritic cell-mediated antigen presentation

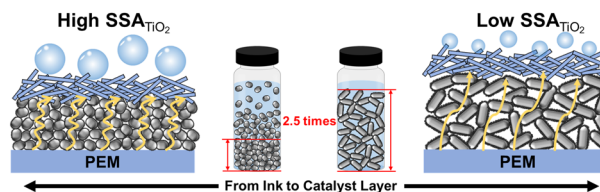
Yingtao Zhong, Ziwen Qiu, Keyan Zhang, Zhenming Lu, Zhuofeng Li, Junmei Nie and Hong Cheng*



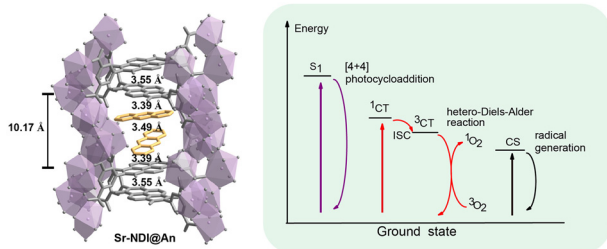
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Is high specific surface area essential for anode catalyst supports in proton exchange membrane water electrolysis?

Kejie Lao, Xinru Liu, Huihong Lin, Linrui Wen, Yaping Pan, Tian Hu, Hua Bing Tao* and Nanfeng Zheng



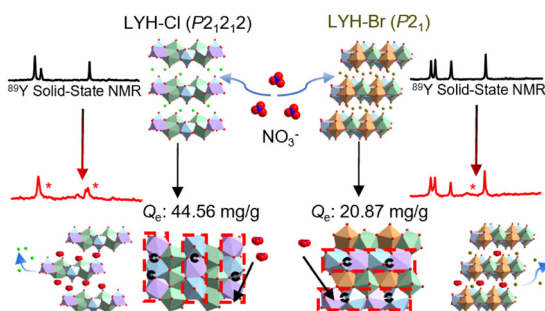
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Wavelength-dependent tri-state photoswitching in crystals via synergistic dimer confinement and charge-transfer stacking

Zhi Huang, Jianwei Wei, Xiang-Yu Wang, Shaojie Xu, Ling Huang and Le Zeng*

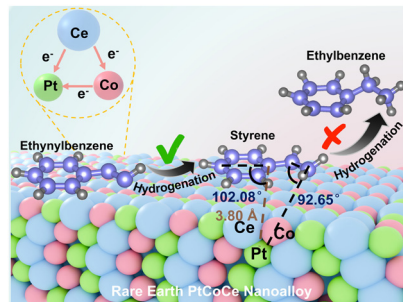
9087



Symmetry-reduction enhancement of nitrate removal on record-breaking layered yttrium hydroxide adsorbents

Xinyue Sheng, Yu Wang and Jun Xu*

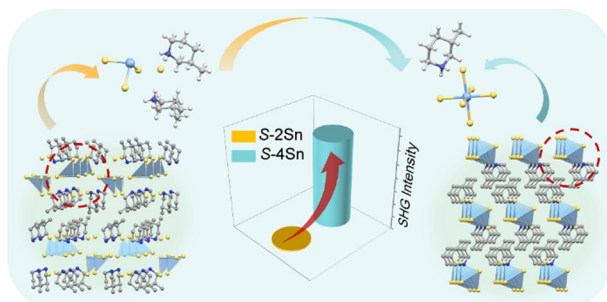
9094



Rare earth valve manipulates dual regulation of electronic states and adsorption geometry in the selective hydrogenation of ethynylbenzene

Kunhong Jiang, Yong Jiang, Zhong Liang, Wenshuo Zhang, Hengjun Liu, Jiali Shi, Siyuan Wang, Ziyun Zhong and Yaping Du*

9106



Regulation of metal valence states for enhancing second harmonic generation performance of chiral tin halides

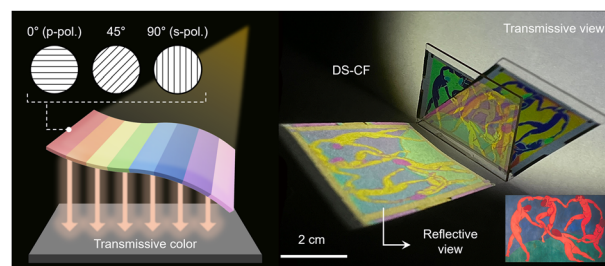
Yue Wang, Puxin Cheng, Wenqing Han, Junjie Guan, Quanwen Li, Zihua Wang, Peihan Wang, Yongshen Zheng* and Jialiang Xu*



9114

Spectrally-coded optical film for independent transmission and reflection on curved surface

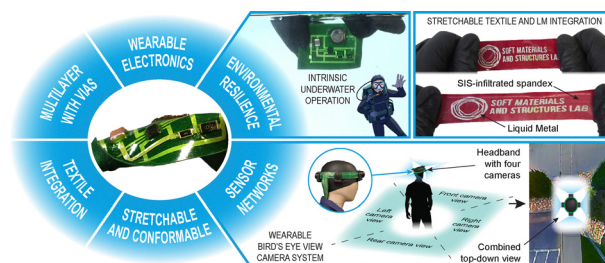
Ji-Eun Yeo, Hyo Eun Jeong, Joo Hwan Ko, Hyeon-Ho Jeong* and Young Min Song*



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Textile-integrated multilayer liquid metal soft circuits for multienvironment wearable electronics

Brittan T. Wilcox, Ella T. Williams and Michael D. Bartlett*



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Color and fluorescence switchable 2D and 3D printed hybrid materials

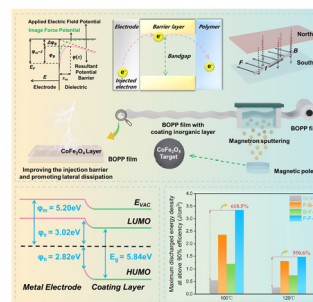
Matthias Steurer, Xingyu Wu,* Agnes C. Morrissey, Konstantin Faershteyn, Magdalena Fladung, Paul Somers, Florian Feist, Martin Bastmeyer, Martin Wegener, Claus Feldmann* and Christopher Barner-Kowollik*



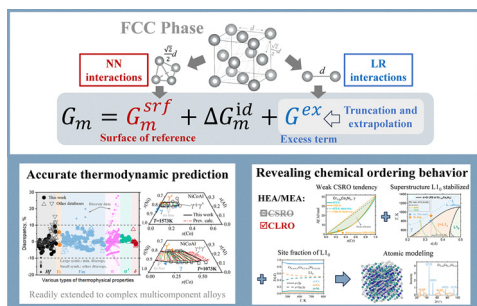
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Substantially enhanced high-temperature capacitive performance in BOPP films via coating with a magnetic inorganic nanolayer

Hai Sun, Shuang Liang, Zhaoliang Xing, Shengkun Niu, Chao Yin, Yue Zhang, Changhai Zhang, Qingguo Chen, Qingguo Chi and Tiandong Zhang*



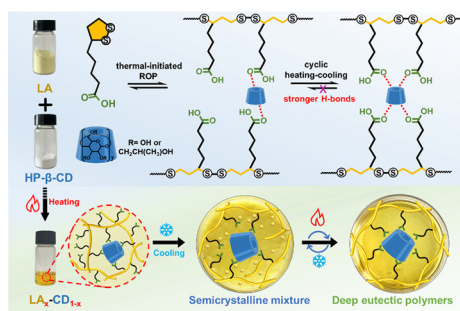
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Decoupling of atomic interactions for accurate thermodynamic prediction in FCC alloys

Jiayi Fan, Jing-Can Liu, Lu Jiang, Xiao-Gang Lu,*
Runhai Ouyang* and Wei Liu*

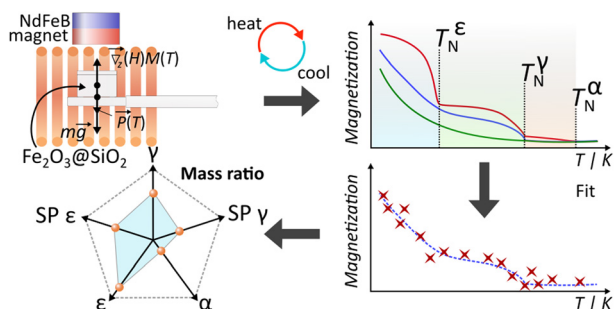
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Reprocessable supramolecular polymer adhesives for on-demand adhesion in multiple scenarios

Chao Fu, Ping Tao, Luqi Liu, Chenchen Xu,
Yuequan Yang, Li Chen, Cui Xiang, Haiguang Xin,
Gang Wang,* Tianhui Ren* and Zhixiang Zeng*

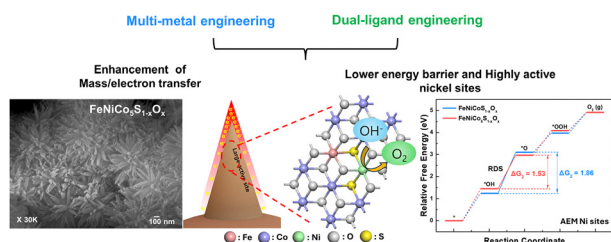
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Thermogravimetry in a gradient magnetic field as an efficient quasi *in situ* method for studying magnetic phase formation: optimizing ε-Fe₂O₃ synthesis

Evgeny A. Gorbachev,* Yifan Wang, Jingtong Duan,
Roy R. Nygaard, Ekaterina S. Kozlyakova and
Lev A. Trusov*

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Ligand-orchestrated transition metal aerogels: a tailored sulfur coordination strategy for superior oxygen evolution catalysis

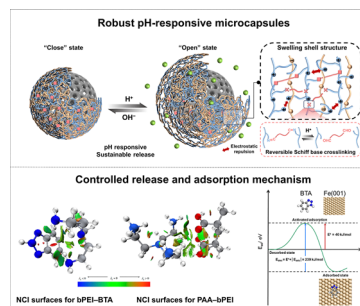
Younghun Kim, Ik Seon Kwon, Sang-Hyun Kim,
Donghyeon Kang, Vinayak G. Parale, Haryeong Choi,
Wonjun Lee, Jiseung Kim, Hyun Jee Heo,
Kug-Seung Lee, Sang-Woo Kim and Hyung-Ho Park*



9211

Environmentally responsive semi-interpenetrating network microcapsules with enhanced stability for corrosion protection

Hongda Zhou,* Zexi Shao, Danila V. Ermolin, Alexander S. Novikov, Ekaterina V. Skorb, Rui Cheng, Dmitry G. Shchukin* and Huaiyuan Wang*



9221

Tri-band smart window envelope based on temperature adaptive kirigami structure

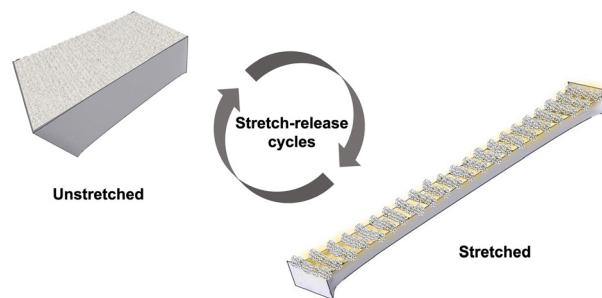
Tao Zhang, Zewei Shao, Cuicui Cao, Chengcong Li, Zhongshao Li, Fei Cao, Genshui Wang, John Bell, Hongjie Luo, Ping Jin and Xun Cao*



9229

Hyperelastic superomniphobic surfaces via microprotrusion-induced stress redistribution

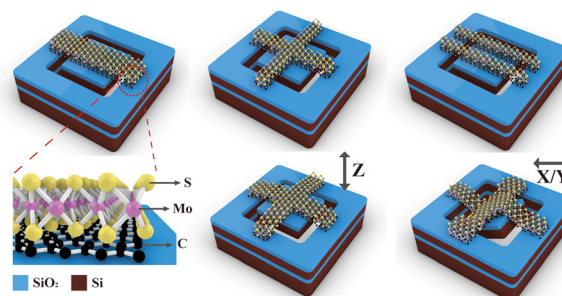
Mohammad Javad Zarei, Sreekiran Pillai, Omar Eldaly, Adil Majeed Rather, Sravanthi Vallabhuneni, Mohammed A. Zikry and Arun Kumar Kota*



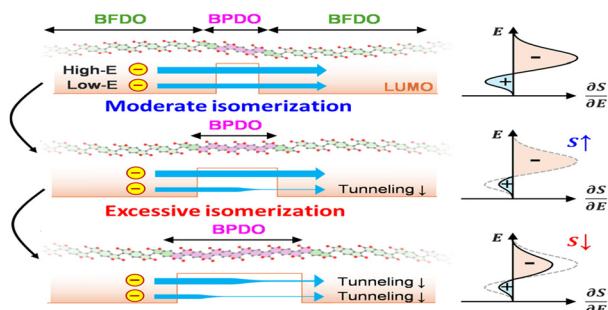
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NEMS acceleration transducers based on MoS₂/graphene heterostructure ribbons with an attached proof mass: a simulation study

Chang He, Quan Liu, Fangcheng Si, Jie Ding,* Wendong Zhang* and Xuge Fan*



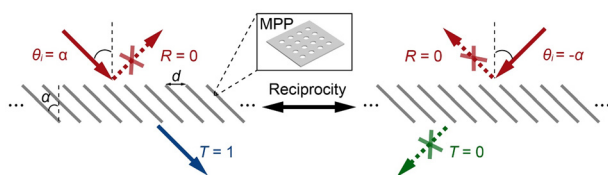
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High-performance organic thermoelectric materials based on n-type conjugated polymers via chemical isomerization-induced charge transport modulation

Hojun Ji, Jeong Gye Lee, Hyunji Lee, Daegun Kim* and Kilwon Cho*

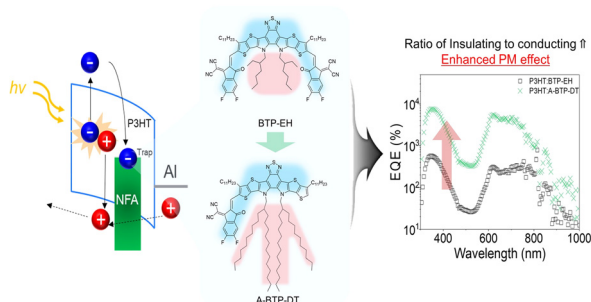
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From directional to omnidirectional: meta-devices for ultrabroadband sound absorption with near-causality-limit performance

Jinjie Shi, Jie Luo,* Chenkai Liu, Hongchen Chu, Yongxin Jing, Changqing Xu, Xiaozhou Liu,* Jensen Li* and Yun Lai*

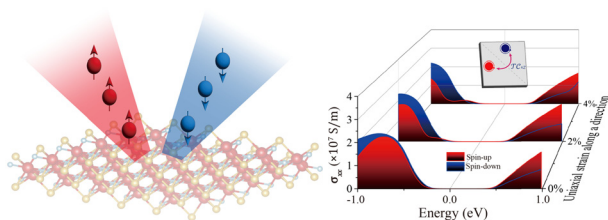
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Fine-control of electron trapping for photomultiplication in organic photodetectors by modulating the insulating properties of nonfullerene acceptors

Min Hun Jee, Xingchao Zhao, Kyo Bin Park, Min Gyu Kang, Xiaoling Ma, Dae Sung Chung,* Fujun Zhang* and Han Young Woo*

9282



Tunable anisotropic crystal spin transport in two-dimensional altermagnetic transition metal oxychalcogenides

He-Ze Zhang, Chaoxi Cui, Jingyi Duan, Tingli He and Run-Wu Zhang*

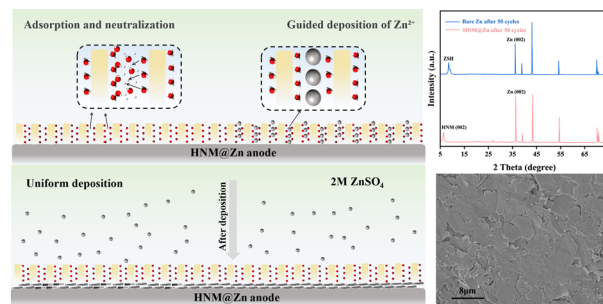


COMMUNICATIONS

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Layered solid Brønsted acid for dynamic interfacial pH regulation toward durable zinc anodes

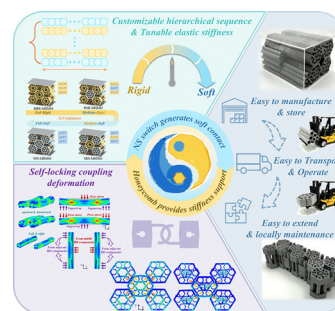
Caofeng Niu, Bing Xu, Jiachen Tian, Tongzhuang He, Lizhu Li, Weiqian Tian, Jingyi Wu, Yue Zhu, Huanlei Wang, Jingwei Chen* and Li-Feng Chen*



9300

Rigid-flexible coupling modular mechanical metamaterials with tunable elasto-plastic properties

Haokai Zheng, Chunlei Li,* Yu Sun, Huifeng Xi, Qiang Han and Xiaohu Yao



CORRECTION

9313

Correction: Erbium: key to simultaneously achieving superior temperature-stability and high magnetic properties in 2:17-type permanent magnets

Zan Long, Chaoyue Zhang, Yuqing Li,* Baoguo Zhang, Mengying Bian, Chong Ling, Youning Kang, Hongguo Zhang, Qiong Wu and Ming Yue*

