

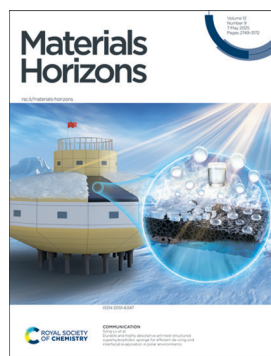
# Materials Horizons

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## IN THIS ISSUE

ISSN 2051-6347 CODEN MHAOAL 12(9) 2749-3172 (2025)



### Cover

See Song Lv *et al.*, pp. 2899–2910. Image reproduced by permission of Song Lv from *Mater. Horiz.*, 2025, 12, 2899.



### Inside cover

See Lydia Helena Wong *et al.*, pp. 2911–2921. Image reproduced by permission of Lydia Helena Wong from *Mater. Horiz.*, 2025, 12, 2911.

## EDITORIAL

2761

**Materials Horizons Emerging Investigator Series:**  
Dr Boran Ma & Professor Zhe Qiang, University of Southern Mississippi, USA

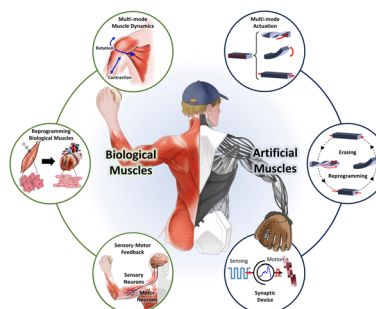


## REVIEWS

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**Empowering artificial muscles with intelligence: recent advancements in materials, designs, and manufacturing**

Saewoong Oh, David Chong, Yunuo Huang and Woon-Hong Yeo\*



# RSC Applied Interfaces

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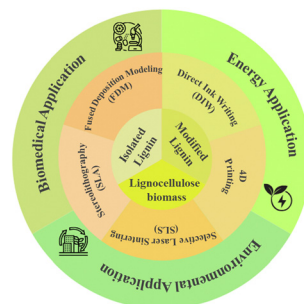
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Fundamental questions  
Elemental answers

2789

## From 3D to 4D printing of lignin towards green materials and sustainable manufacturing

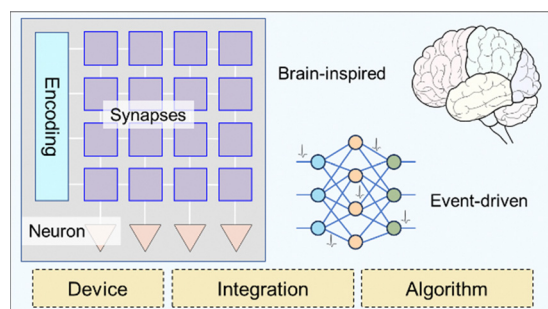
Tingting Wu, Sigit Sugiarto, Ruochen Yang, Thenapakiam Sathasivam, Udyani Aloka Weerasinghe, Pei Lin Chee, Odelia Yap, Gustav Nyström\* and Dan Kai\*



2820

## Towards scalable memristive hardware for spiking neural networks

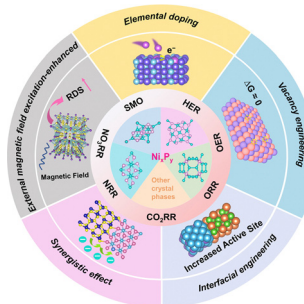
Peng Chen, Bihua Zhang, Enhui He, Yu Xiao, Fenghao Liu, Peng Lin,\* Zhongrui Wang\* and Gang Pan\*



2840

## Applications, performance enhancement strategies and prospects of Ni<sub>x</sub>P<sub>y</sub> in electrocatalysis

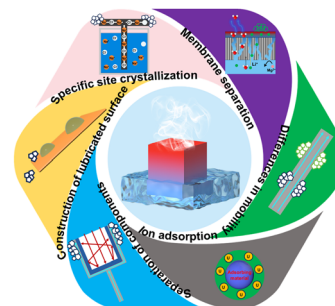
Chenjing Wang, Yuquan Yang, Yanru Yuan, Qian Lv, Li Zhou, Lulu Wang, Xiaoyue Zheng, Jiajia Liu, Hongjing Wu, Dawei Pang\* and Jinlong Zheng\*



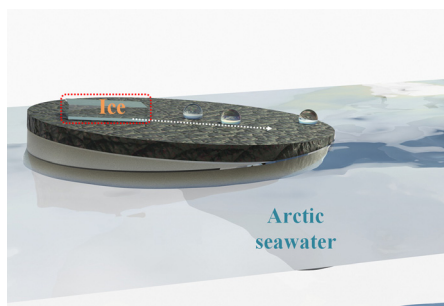
2878

## Multifunctional solar-driven interfacial evaporation system for simultaneous clean water production and high-value-added ion extraction

Jing Wu, Guang Yin, Ji Liu,\* Zhong-Zhen Yu\* and Xiaofeng Li\*



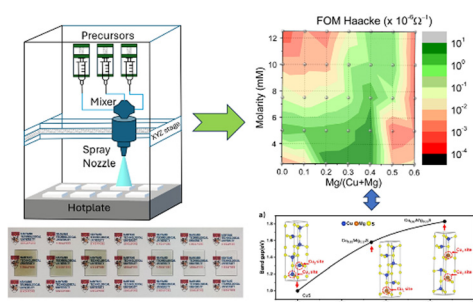
2899



## Durable and highly absorptive ant-nest structured superhydrophobic sponge for efficient de-icing and interfacial evaporation in polar environments

Tonghui Lu, Xianglin Li, Wenhao Lv, Haoliang Bai, Mengying Lu, Zuoqin Qian and Song Lv\*

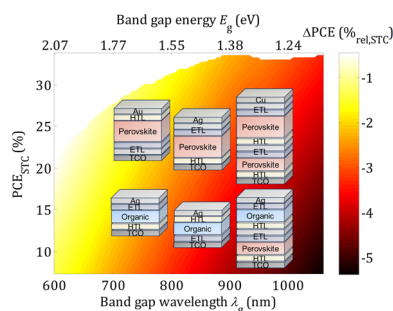
2911



## Experimental and computational insights into CuS–Mg composites for high-performance p-type transparent conducting materials

Stener Lie, Qingde Sun, Prithish Mishra, Patrick Wen Feng Li, Anupam Sadhu, Teddy Salim, Shuzhou Li, Geoffroy Hautier and Lydia Helena Wong\*

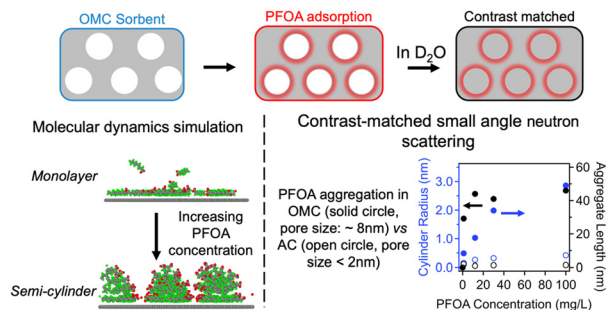
2922



## Solar photons beyond the band gap wavelengths: their effect on solution-processed solar cells

George Perrakis,\* Apostolos Panagiotopoulos, Temur Maksudov, Chrysa Aivalioti, Essa A. Alharbi, Shadi Fatayer, Martin Heeney, Anna C. Tasolamprou, George Kenanakis, Konstantinos Petridis, Thomas D. Anthopoulos, S. Ravi P. Silva, Michael Graetzel, Maria Kafesaki and George Kakavelakis\*

2935



## Critical role of pore size on perfluorooctanoic acid adsorption behaviors in carbonaceous sorbents

Mark Robertson, Bradley Lamb, Anthony Griffin, Lilin He,\* Boran Ma\* and Zhe Qiang\*

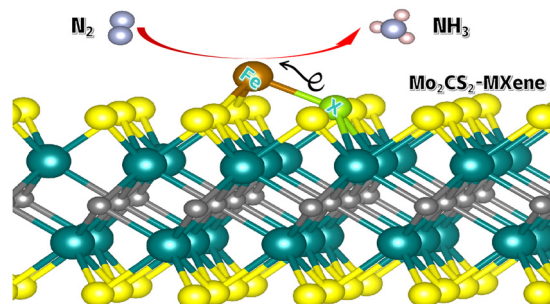


## COMMUNICATIONS

2945

### Unveiling the electrochemical nitrogen reduction reaction mechanism in heteroatom-decorated-Mo<sub>2</sub>CS<sub>2</sub>-MXene: the synergistic effect of single-atom Fe and heteroatom

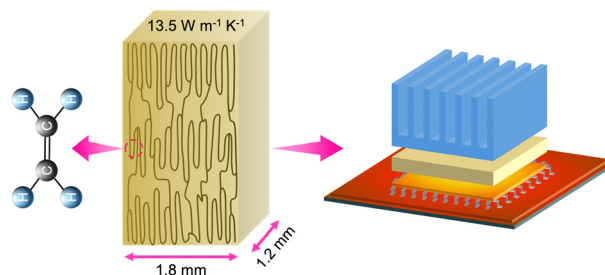
Neng Li,\* Bin Liu, Zhongyong Zhang, Yucheng Feng, Zheng Wang, Arramel Arramel, Xing Zhou and Xin Li



2957

### Bulk thermally conductive polyethylene as a thermal interface material

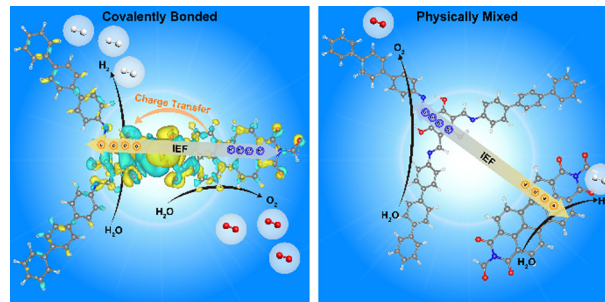
Gangchen Ren, Zhongtong Wang, Xinzhu Huang, Daniel Hur, Mark A. Pfeifer, Meredith N. Silberstein and Zhiting Tian\*



2965

### Construction of organic heterojunctions as metal-free photocatalysts for enhancing water splitting and phenol degradation by regulating charge flow

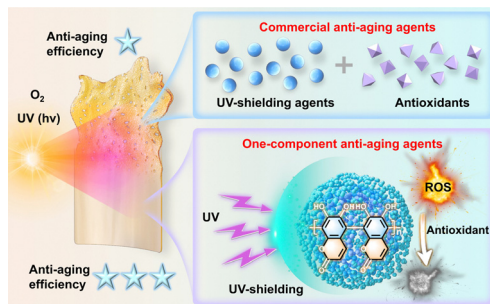
Yang You, Xiaoyu Shi, Liang Huang, Jie Zhao, Wen Ji, Libo Li, Donglei Bu\* and Shaoming Huang\*



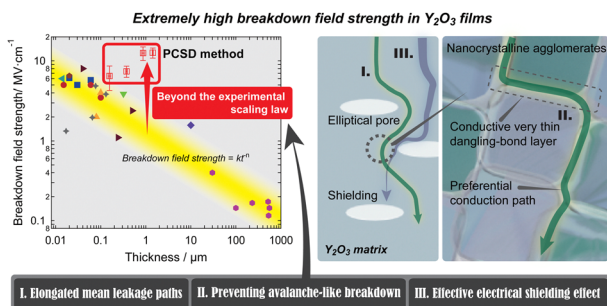
2977

### One-component anti-aging agents

Rong Zhang, Bo Liang, Wanjie Bai, Junfei Hu, Tianyou Wang, Yiyang Yang, Hongwei Bai, Lei Yang\* and Yiwen Li\*



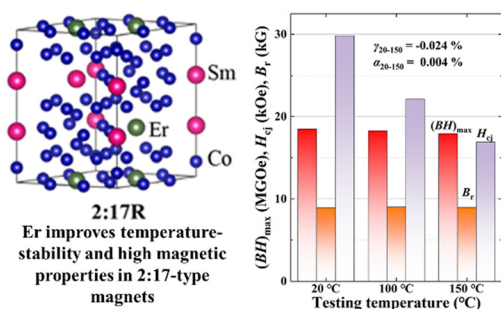
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### A strategy for increasing the breakdown field strength beyond the experimental scaling law in yttria films

Tomohiko Nakajima,\* Yuuki Kitanaka, Iwao Yamaguchi, Kazuhiro Kumagai, Junichi Nomoto, Masayuki Fukuda and Ryohei Hokari

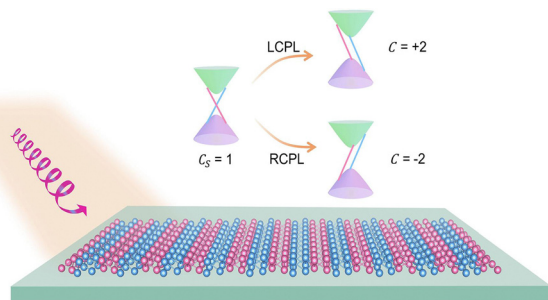
2999



### 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\*

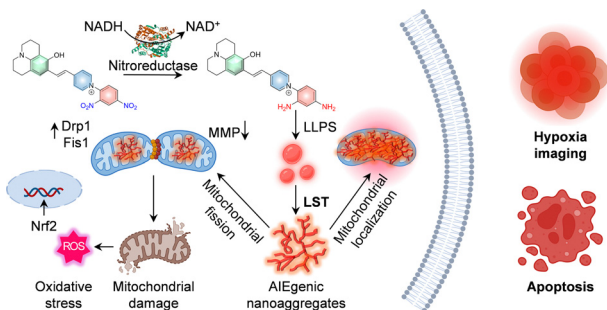
3011



### Quantum anomalous Hall effect in a nonmagnetic bismuth monolayer with a high Chern number

Zequn Zhang, Runhan Li, Yingxi Bai, Yilin Zhang, Baibiao Huang, Ying Dai\* and Chengwang Niu\*

3017



### Enzyme-induced liquid-to-solid phase transition of a mitochondria-targeted AIEgen in cancer theranostics

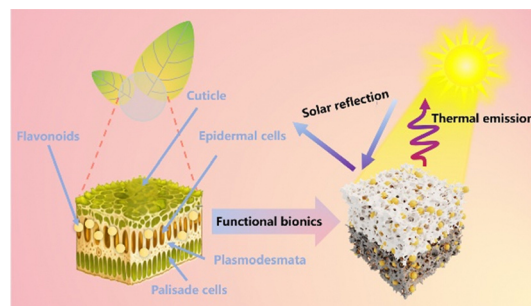
Shreyasri Sain, Madhu Ramesh, Krithi K. Bhagavath and Thimmaiah Govindaraju\*



3024

### A leaf-like structured membrane for highly efficient and persistent radiative cooling

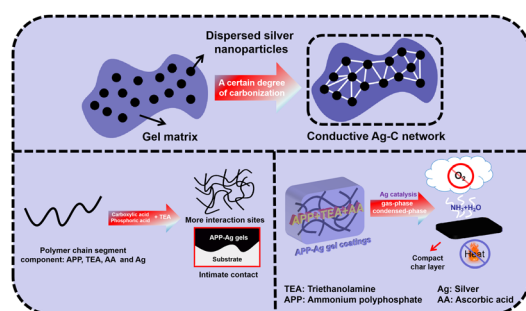
Minghan Wu, Yu Li, Gang Huang, Ruiqi Xu, Xiaochun Yin and Guizhen Zhang\*



3036

### Ethanol-induced ammonium polyphosphate–silver gel paint: breaking the trade-off between conductivity, flame retardancy and adhesion in single-layer functional coatings

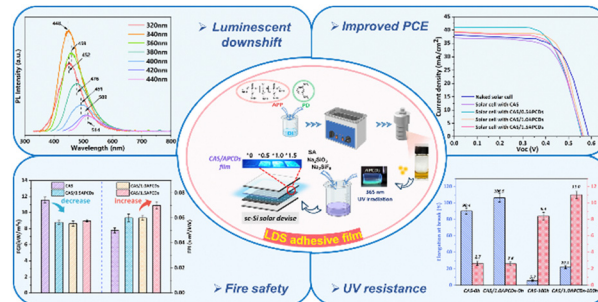
Zilong Wang, Wanze Wu and Xiao Gong\*



3051

### Advanced room-temperature cured encapsulant film for crystalline silicon solar modules: enhancing efficiency with luminescent down-shifting, flame retardancy, and UV resistance

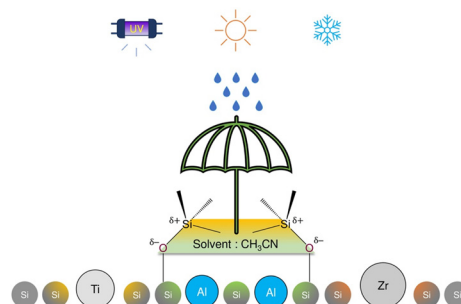
Shuang Qiu, Huaibo Qian, Jun Sun,\* Xiaoyu Gu, Haiqiao Wang and Sheng Zhang\*



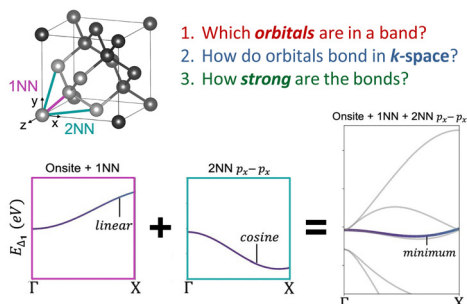
3062

### Exploration of halogen-free sustainable superhydrophobic materials for surface protection from multi-contaminants in all weather conditions

Anu Pulparambil, Bitan Ray, Subhajit Chakraborty and Sebastian C. Peter\*



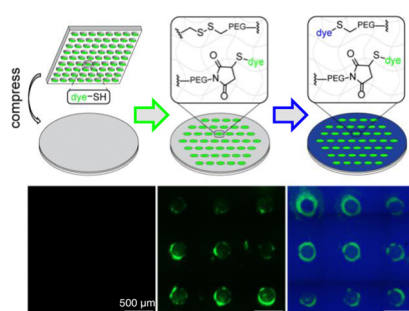
3073



### Why does silicon have an indirect band gap?

Emily Oliphant, Veda Mantena, Madison Brod,  
 G. Jeffrey Snyder and Wenhao Sun\*

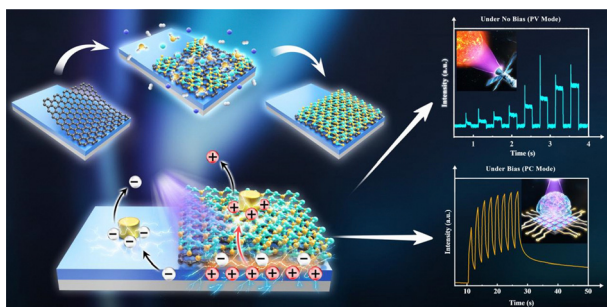
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### Multi-step functionalization of hydrogels through mechano- and photo-responsive linkages

Zihao Li, Chavinya D. Ranaweera, Kang Lin,  
 Yuwan Huang, Thomas G. Molley, Lei Qin,  
 Jamie J. Kruzic and Kristopher A. Kilian\*

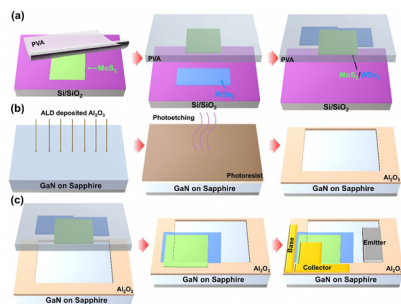
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### Multifunctional UV photodetect-memristors based on area selective fabricated $\text{Ga}_2\text{S}_3/\text{graphene}/\text{GaN}$ van der Waals heterojunctions

Zhengliang Lin, Junrui Chen, Zhuohang Zheng,  
 Quanguang Lai, Zhiqi Liu, Liwei Liu,  
 Jiaying Xiao and Wenliang Wang\*

3105



### High current density heterojunction bipolar transistors with 3D-GaN/2D-WSe<sub>2</sub> as emitter junctions

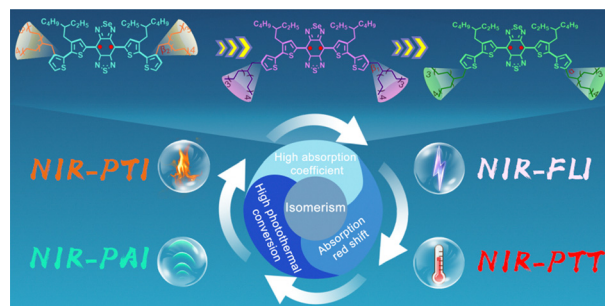
Mingjun Xu, Guoxin Li, Zhonghong Guo, Jianbo Shang,  
 Xiaohang Li, Fangliang Gao\* and Shutu Li\*



3115

### Regioisomerism in NIR-II-emissive semiconducting biradicals for high-performance bioimaging and phototheranostics of tumors

Yu Luo, Ying Liu, Wenbin Chen, Yijian Gao, Lijun Kan, Huan Chen, Yu Wang, Mingde Li,\* Shengliang Li\* and Xiao-Hong Zhang\*



3127

### Photothermal and robust supramolecular soft material crosslinked *via* dinuclear heterodentate coordination

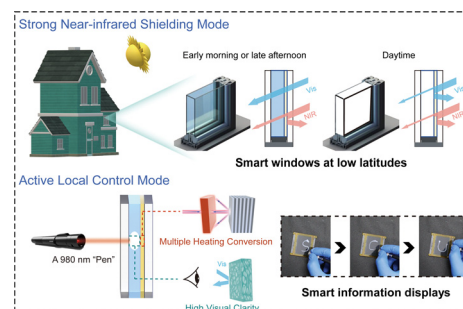
Huijuan Lu, Haohan Tong, Bingbing Gao, Jingyi Zhu and Shuidong Zhang\*



3144

### Multi-functional smart bulk hydrogel panels with strong near-infrared shielding and active local control

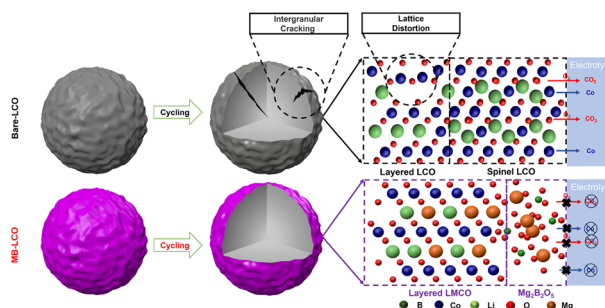
Yitong Ding, Gang Li, Keunhyuk Ryu, JianGuo Guan, Shancheng Wang, Ying Xiong,\* Shaoyun Guo and Yi Long\*



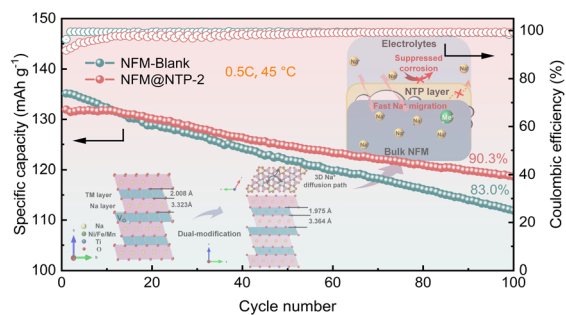
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### Suppressing intergranular cracking with near-surface layer regulation for electrochemical-thermal stabilization of LiCoO<sub>2</sub>

Kangwei Song, Yu Shen, Tongmin Xu, Yushuang Lin, Zheming Chen, Weicheng Zhang, Congyu He, Zhenzhong Yang,\* Ke Qu,\* Zheyuan Liu,\* Yan Yu and Chengkai Yang\*



3160



### *In situ* formation of NaTi<sub>2</sub>(PO<sub>4</sub>)<sub>3</sub> coating layers to enhance the high-temperature performance of NaNi<sub>1/3</sub>Fe<sub>1/3</sub>Mn<sub>1/3</sub>O<sub>2</sub> cathode materials

Wu Meng, Huajun Guo, Zhixing Wang, Guangchao Li, Bichao Wu, Jiexi Wang, Wenjie Peng, Xinhai Li, Hui Duan and Guochun Yan\*

