

# Journal of Materials Chemistry A

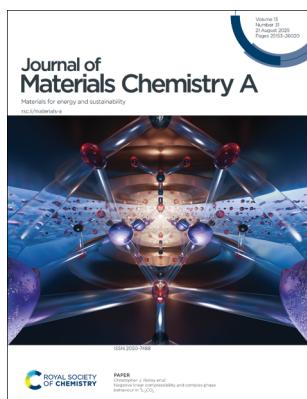
Materials for energy and sustainability

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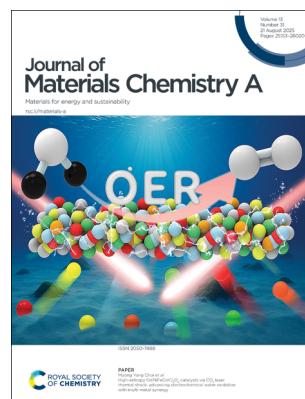
## IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 13(31) 25153–26020 (2025)



### Cover

See Christopher J. Ridley et al., pp. 25335–25344.  
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### Inside cover

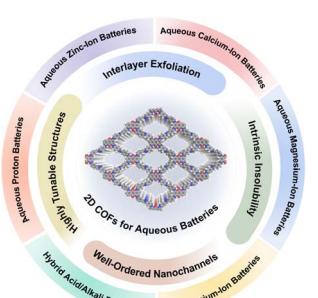
See Myong Yong Choi et al., pp. 25345–25355.  
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## REVIEWS

25174

### 2D covalent organic frameworks: organic electrode materials for aqueous batteries

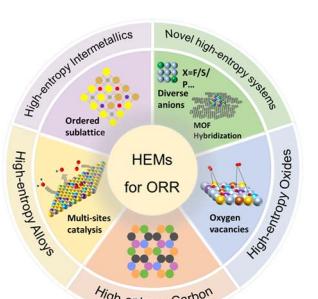
Xiaoli Yan,\* Manrong Li, Lu Zhang, Yingna Chang, Tianxue Wan, Jindi Wang, Kefan Song, Yu Liu, Yuzhen Sun, Huayu Wu, Rong Xing\* and Heng-Guo Wang\*



25195

### High-entropy materials for electrocatalytic oxygen reduction reaction

Ziheng Liang, Yuyue Yang, Zhanpeng Tao, Rui Gao, Yaping Chen\* and Peng Li\*





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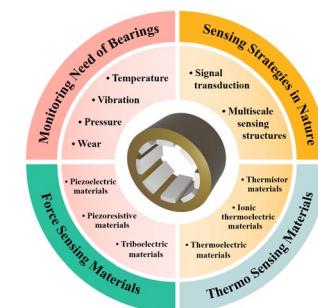
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## REVIEWS

25213

**Bioinspired self-sensing materials: from comprehensive advances to outlook on self-monitoring water-lubricated bearings**

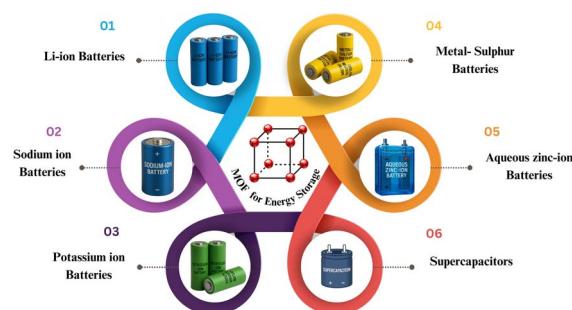
Dingyuan Zhao, Zhiwei Guo\* and Chengqing Yuan\*



25258

**Advances in metal–organic framework-based materials for sustainable energy solutions**

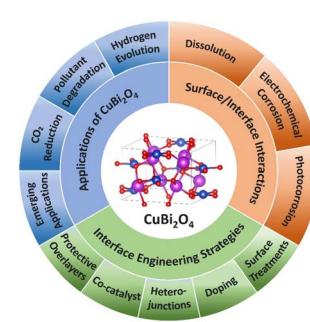
Muhammad Altaf Nazir,\* Sami Ullah, Asif Jamil, Ibrahim A. Shaaban, Lala Gurbanova, Karim Khan, Syed Shoaib Ahmad Shah\* and Shu-Juan Bao\*



25304

**Interfacial chemistry of CuBi<sub>2</sub>O<sub>4</sub> in aqueous media: engineering strategies for energy and environmental applications**

Haotian Wang, Hao Wang, Jing Gao and Yongbo Kuang\*

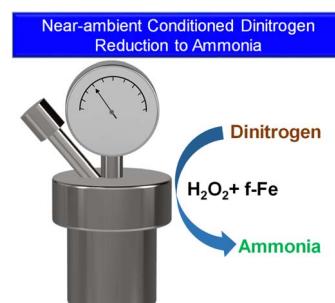


## COMMUNICATIONS

25316

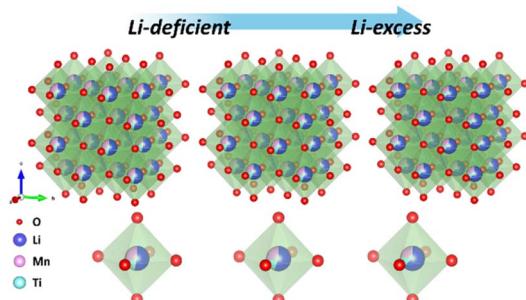
**Hydrogen peroxide driven dinitrogen reduction to ammonia**

Rohit, Anjali Kumari Garg, Vishrant Kumar and Sumit Kumar Sonkar\*



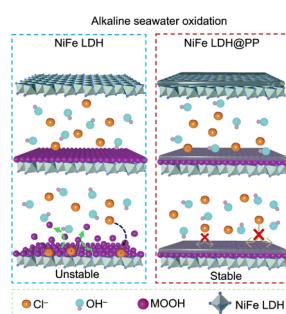
## COMMUNICATIONS

25321

**Optimized amounts of excess Li in cation-disordered rocksalt cathodes assisted by carbon nanotubes**

Hyeonji Jeong, Junyoung Lee, Keun Hwa Chae, Sungjun Kwak, Young-Ho Lee, Dae Hong Jeong, Sang Mun Jeong\* and Ayeong Byeon\*

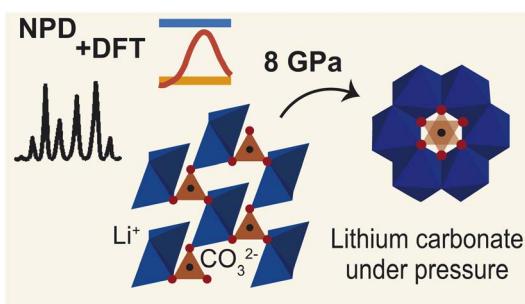
25329

**PEDOT:PSS-modified NiFe layered double hydroxide enables efficient and durable seawater electrolysis at high current density**

Chaoxin Yang, Yixin Guo, Shengjun Sun, Zixiao Li, Li Yao, Hefeng Wang, Min Zhang, Meng Yue, Dongdong Zheng, Yongchao Yao, Fatma A. Ibrahim, Mohamed S. Hamdy, Yanqin Lv,\* Imran Shakir, Xuping Sun\* and Bo Tang

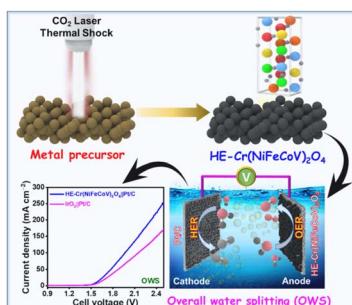
## PAPERS

25335

**Negative linear compressibility and complex phase behaviour in  ${}^7\text{Li}_2\text{CO}_3$** 

Christopher J. Ridley,\* Fabio Orlandi, Craig L. Bull, Nicholas P. Funnell, Jasmine K. Hinton, Robin S. Perry, Stephen Hull and Rebecca Wurr

25345

**High-entropy Cr(NiFeCoV)<sub>2</sub>O<sub>4</sub> catalysts via CO<sub>2</sub> laser thermal shock: advancing electrochemical water oxidation with multi-metal synergy**

Sharanya Kannan Anbarasu, Raja Arumugam Senthil, Sieon Jung, Anuj Kumar, Mohd Ubaidullah and Myong Yong Choi\*

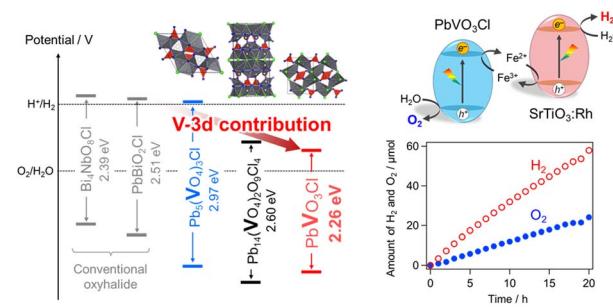


## PAPERS

25356

## Vanadium-based oxyhalide photocatalysts for visible-light-driven Z-scheme water splitting: advancing conduction band engineering

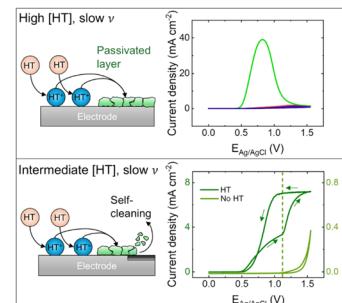
Hajime Suzuki,\* Ryuki Tomita, Yusuke Ishii, Osamu Tomita, Akinobu Nakada, Akinori Saeki and Ryu Abe\*



25363

## Investigation of electrode passivation during oxidation of a nitroxide radical relevant for flow battery applications

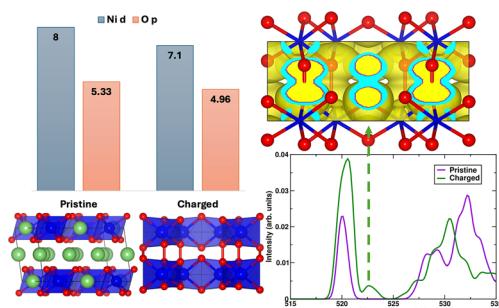
Cailin Buchanan, Nora A. Shaheen, Caroline K. Williams, Igor Messias, Bethany Dean-Kersten, Taewoo Kim, Justin G. Connell, Venkat Srinivasan, Rohan Akolkar and Pietro Papa Lopes\*



25375

## Demystifying charge-compensation mechanisms and oxygen dimerization in Li-rich $\text{Li}_2\text{NiO}_3$ cathodes

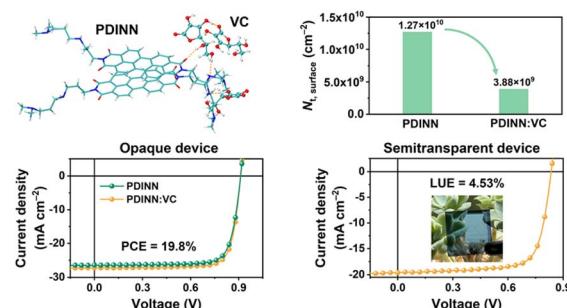
Hrishit Banerjee,\* Clare P. Grey and Andrew J. Morris



25384

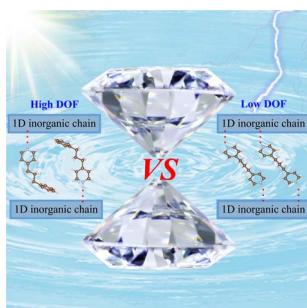
## Vitamin C modified cathode interlayer for efficient opaque and semitransparent organic photovoltaics

Hailin Yu, Jiayu Wang,\* Yingyue Hu, Cenqi Yan, Qichao Ran and Pei Cheng\*



## PAPERS

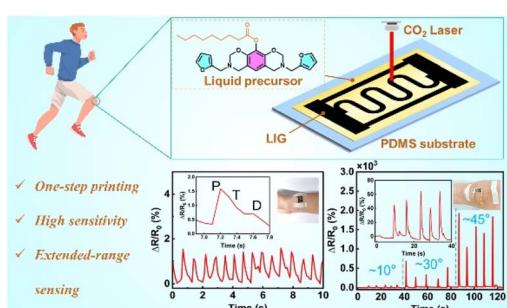
25392



### Crucial impact of degrees of freedom on the pressure-induced optical properties of water-stable 1D perovskites

Mengge Zhang, Wenhui Zhang, Yawei Niu, Xiao Tang, Pin Lv,\* Jie Xu, Xiaoyue Fa, Chutong Zhang, Liaokuo Gong, Zhaolai Chen\* and Xiaobing Liu\*

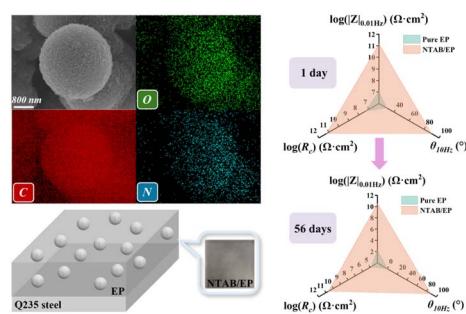
25400



### A laser-induced graphene/PDMS composite sensor with a dual structure enabling high-sensitivity under micro-strain and extended-range sensing

Guangmeng Chen, Ming Mu, Wenjie Yu, Li Jia, Ziqiang Hu, Weiwei Zhao\* and Xiaoqing Liu\*

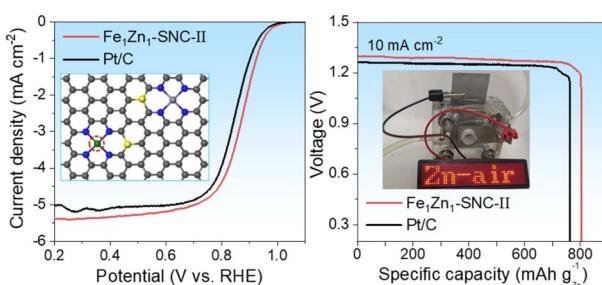
25412



### Achieving superior anti-corrosion performance with spherical organic additives and synergistic barrier passivation mechanisms

Xinyue Zhang, Haibing Zhang, Zhimin Jiang,\* Zhaolei Li, Minjie Shi,\* Edison Huixiang Ang\* and Jun Yang\*

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### Atomically dispersed Fe/Zn synergy in sulfur-modified nitrogen-doped carbon for boosting oxygen reduction activity

Ting Wang, Zongge Li,\* Wenjun Kang, Rui Li, Konggang Qu, Lei Wang, Fanpeng Meng\* and Haibo Li\*

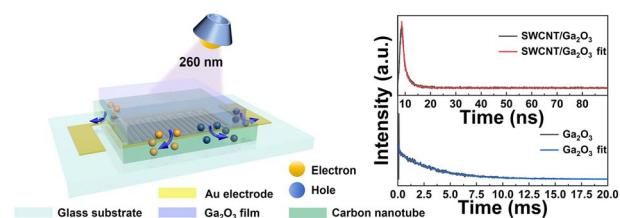


## PAPERS

25435

**Engineered s-SWCNT network/a-Ga<sub>2</sub>O<sub>3</sub> heterointerface for enhanced deep ultraviolet photodetection**

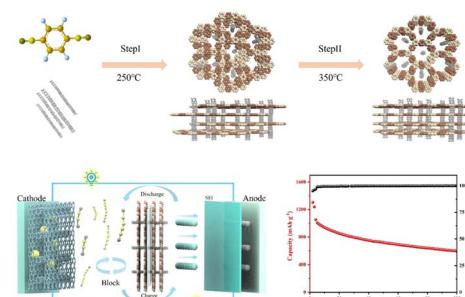
Zhenwei Guo, Yisong Chen, Haoming Wei,\* Dayong Jiang,\* Man Zhao and Qianli Huang\*



25444

**Enhancing the catalytic conversion of polysulfides utilizing a covalent organic framework–carbon nanotube interlayer**

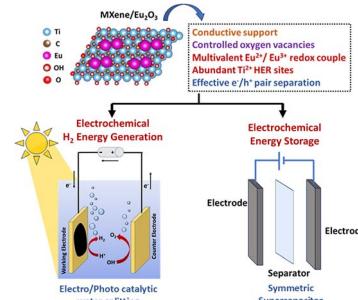
Bowen Sun, Feng Huo,\* Chongchong Zhao, Jinhai He, Jiaojiao Xue, Zhiqiang Sun, Jiayao Wu, Xuntao Wang, Jiali Wang, Ruizheng Zhao\* and Zixu Sun\*



25457

**Oxygen vacancy engineering in MXenes for sustainable electrochemical energy conversion and storage applications**

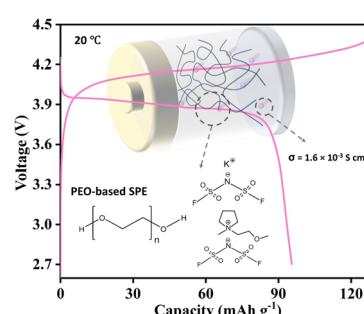
Vaishali Sharma, Jasvir Singh, Rajnish Dhirman, Davinder Pal Sharma and Aman Mahajan\*



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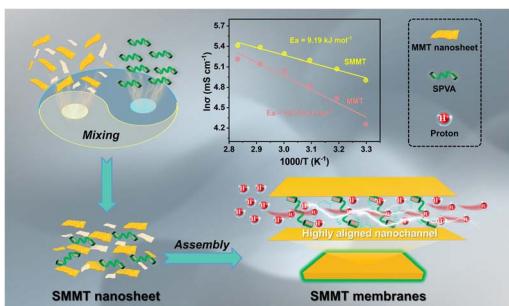
**Polymer electrolytes for potassium batteries: incorporating ionic liquids to enhance the room temperature ionic conductivity**

Jinyu Chen, Sohelia Ebrahimi-Koodehi, Boyan Iliev, Yuval Steinberg, Michal Leskes, Thomas J. S. Schubert, Elizabeth Castillo-Martínez, Dominic Bresser and Maider Zarabeitia\*



## PAPERS

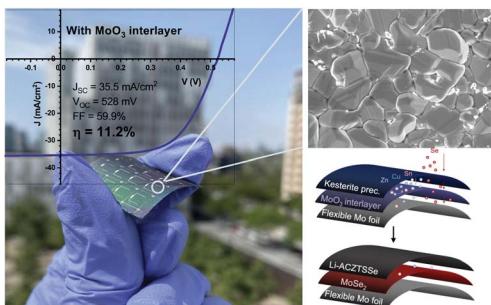
25489



## A dual-constrained assembly strategy of highly aligned two-dimensional montmorillonite membranes for efficient proton transport

Zhenlei Wang, Lianqiu Huang, Lingjie Zhang,\* Tingting Zhang, Jianglin Yan, Licai Chen, Xiongrui Jiang, Damiano Sarocchi, Shaoxian Song, Viridiana García Meza, Mildred Quintana and Yunliang Zhao\*

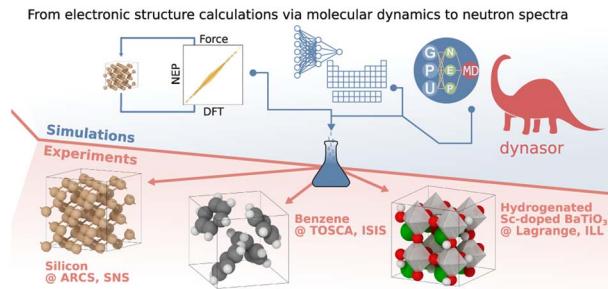
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## Strategies for back contact engineering in high-performance flexible kesterite solar cells

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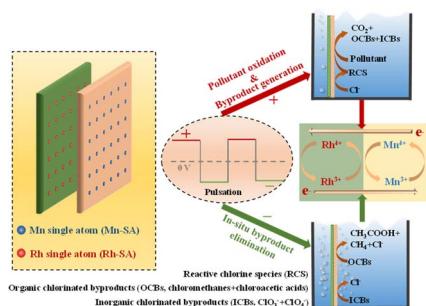
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## Predicting neutron experiments from first principles: a workflow powered by machine learning

Eric Lindgren,\* Adam J. Jackson, Erik Fransson, Esmée Berger, Goran Škoro, Svetmir Rudić, Rastislav Turanyi, Sanghamitra Mukhopadhyay and Paul Erhart\*

25521



## Tuning valence-variable single atomic metal for efficient antibiotic degradation and *in situ* chlorinated byproduct elimination under current pulsation

Yang Yu, Yibo Lin, Binyao Wang, Yangqi E, Qian Li, Huachang Jin, Raúl Muñoz Torre, Zhao Huang, Jianmeng Chen and Dongzhi Chen\*

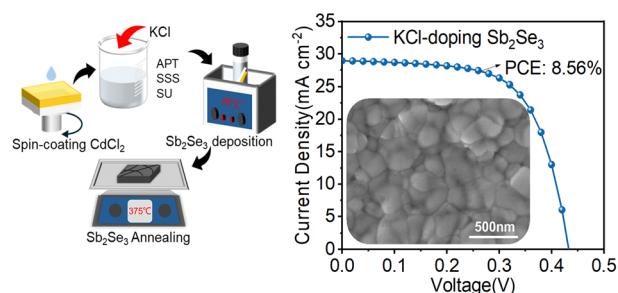


## PAPERS

25534

**High-performance antimony selenide solar cells enabled by *in situ* potassium doping**

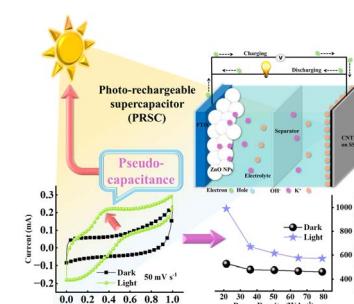
Xiaokun Zhang, Yufei Hu, Xiaomin Wang,\* Wenhao Zhang, Dongyu Liu, Zongyuan Jin, Jie Pan, Sanyuan Hou, Xueling Chen, Yingying Mo, Xuefeng Chen, Kefan Wang,\* Xudong Xiao and Jianmin Li\*



25543

**Light-driven enhancement in the pseudocapacitance of nanosized ZnO particles and carbon nanotube-based photo-rechargeable supercapacitors**

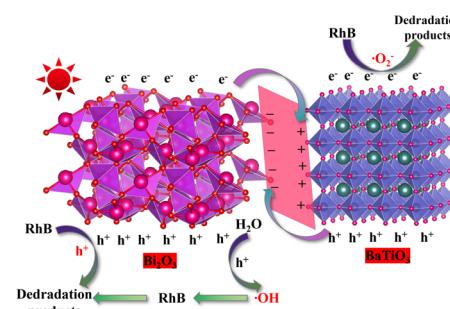
Priyanka Saini, Jitendra Kumar Yadav, Bharti Rani and Ambesh Dixit\*



25559

**An innovative S-scheme  $\beta$ -Bi<sub>2</sub>O<sub>3</sub>/BaTiO<sub>3</sub> heterojunction nanocomposite with enhanced stability and photocatalytic performance**

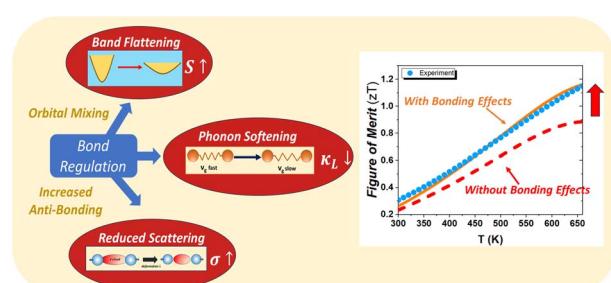
Dandan Yang, Xu Guo, Yu Su, Yanhua Chen, Jie Ding, Dengwei Hu and Lan Ding\*



25579

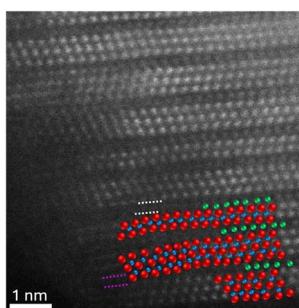
**Bonding mediated coupling of electron band mass and phonon group velocity: an effective strategy to improve the thermoelectric performance of solid solutions**

Bharti Agrawal, Himanshu Sharma, Jayachandran Babu, Tanusri Saha-Dasgupta, Aftab Alam and Titas Dasgupta\*



## PAPERS

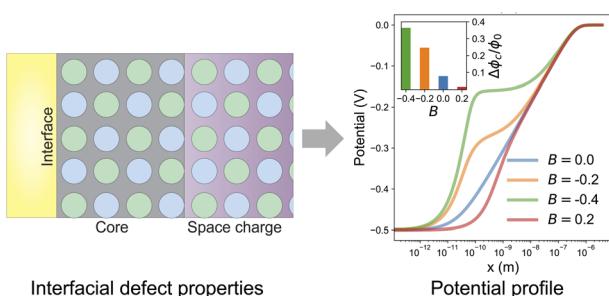
25590



**Direct formation of MXene domains and compositional defects in magnetron sputtered  $V_2AlC-AlO_x$  heterostructures revealed by theory and experiments**

P. J. Pöllmann, R. Sahu, M. Fečík, C. Scheu and J. M. Schneider

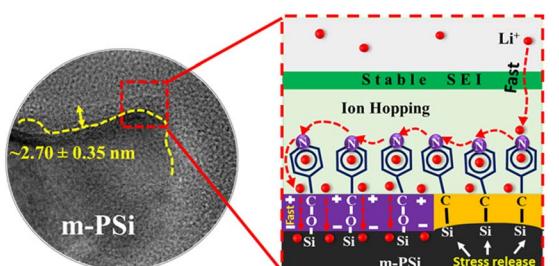
25599



**A unified and consistent electrical double layer model for the treatment of core and space charge layers in solid electrolytes**

Zeeshan Ahmad\*

25609

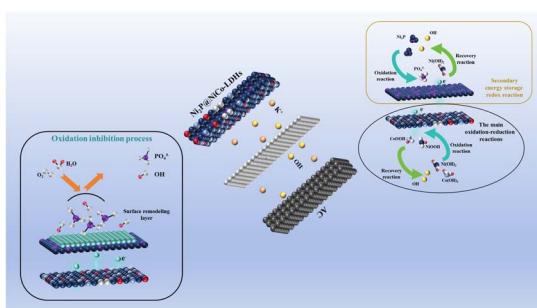


Ultra-thin Pyridinic layer for Enhanced Li-ion diffusion and Storage

**Superior performance of an ultrathin pyridinic-layered micro-structural porous silicon anode with a silicon content exceeding 99%**

Mahesh B. Naikwade, Pranav K. Katkar and Sang-Wha Lee\*

25626



**Construction of aqueous supercapacitors with oxidation suppression of nickel phosphide via interfacial engineering and electric field modulation for enhanced secondary energy storage**

Haiyang Zhai, Jie He,\* Suili Shi, Mingtang Liu, Zhibing Wang and Zhiliang Jin\*

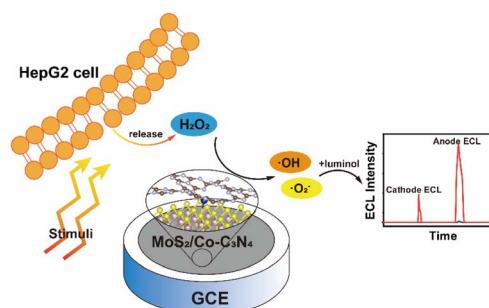


## PAPERS

25644

**Single-atom catalysts integrated with semiconductors for constructing a dual-potential electrochemiluminescence sensor for intracellular H<sub>2</sub>O<sub>2</sub> detection**

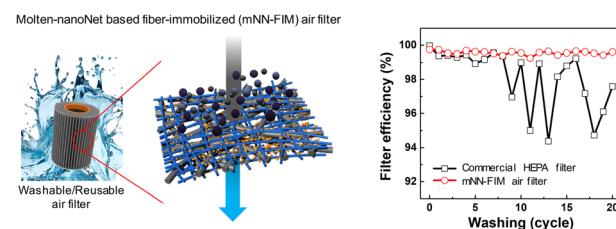
Yiran Ying, Tianyou Chen, Arzugul Ablimit, Chan Zhang, Bing Sun, Jing Wu\* and Wu Liu\*



25655

**Reusable Molten-nanonet fiber-immobilized air filter with polycaprolactone–polyvinylidene fluoride electrospun nanofibers for enhanced water-wash durability**

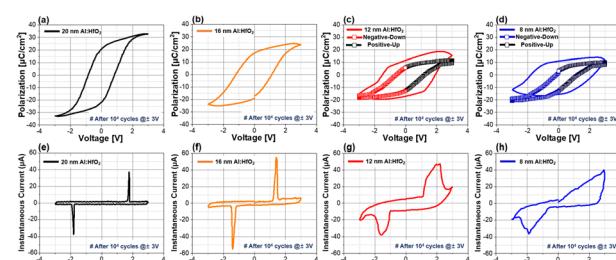
Taekyung Lim, Sang-Mi Jeong, Jonguk Yang, Keumyoung Seo, Hyunah Park, Shinji Han, Chaeyoon Kim, Hee Sung Seo\* and Sanghyun Ju\*



25673

**Low coercive field in quasi-epitaxial Al-doped HfO<sub>2</sub> films for energy-efficient ferroelectric memories**

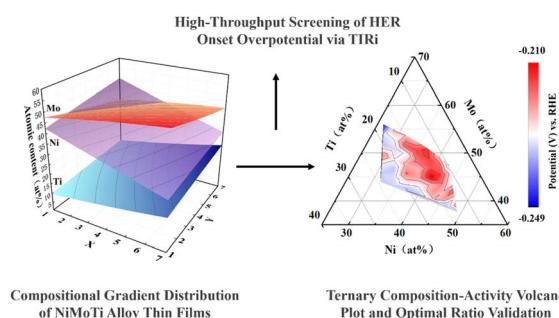
In Pyo Hong, Rui He, Thi My Huyen Nguyen, Jae ho Park, Min Joon Kim and Chung Wung Bark\*



25683

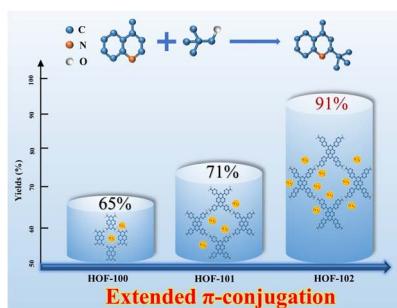
**Research on NiMoTi alloy thin film hydrogen evolution catalysts via high-throughput screening using total internal reflection imaging**

Zi-Xin Wu, Xuan Xiao, Huang Chen, Zeng-Xian Fang, Man-Zhen Lin, Hao Lin, Lian-Yu Li, Huai-Yi Xu, Jing-Yu Xi, Dong-Zhi Li,\* Wei-Bing Liao\* and Le Liu\*



## PAPERS

25693



### Modulating photocatalytic decarbonylative Minisci alkylation through conjugation engineering in pyrene-based hydrogen-bonded organic frameworks

Rong-Xin Zhu, Guang-Lu Li, Hui Liu, Shengsheng Yu\* and Ling-Bao Xing\*

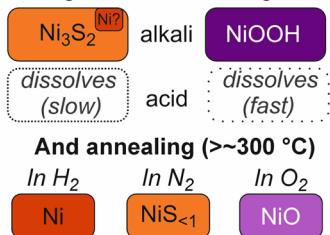
25703

ALD of  $\beta$ -NiS ( $\text{Ni}_9\text{S}_8$ )

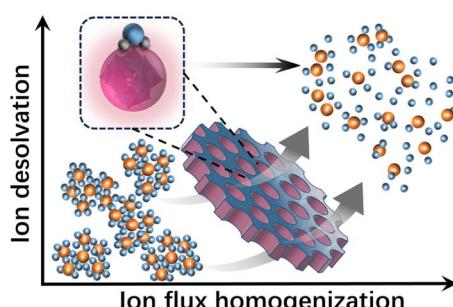
- ✓ High growth rate
- ✓ Low-cost precursor
- ✓ Low resistivity
- ✓ High film purity

 $\beta$ -NiS transforms to

During HER      During OER



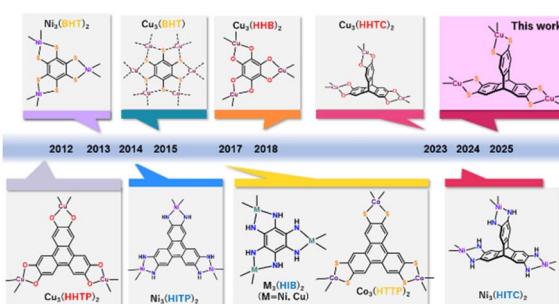
25715



### Atomic layer deposition of nickel sulfide thin films and their thermal and electrochemical stability

Miika Mattinen,\* Johanna Schröder, Timo Hatanpää, Georgi Popov, Kenichiro Mizohata, Markku Leskelä, Thomas F. Jaramillo, Michaela Burke Stevens, Stacey F. Bent and Mikko Ritala\*

25724



### Two-dimensional conductive metal-organic framework with 2,3,6,7,14,15-trptycenehexathiol (TCHT) ligand: synthesis, structure, electrical conductivity and CO<sub>2</sub>RR activity

Wataru Murakami, Taku Kitayama, Yuta Chiba, Haruko Moteki, Risa Shirato, Kazuyuki Iwase, Ryojun Toyoda, Ryota Sakamoto\* and Shinya Takaishi\*

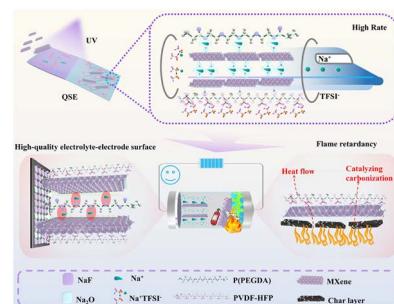


## PAPERS

25732

**MXene-enhanced PEGDA crosslinked quasi-solid electrolytes: a flame-retardant 3D network for high-performance sodium-ion batteries**

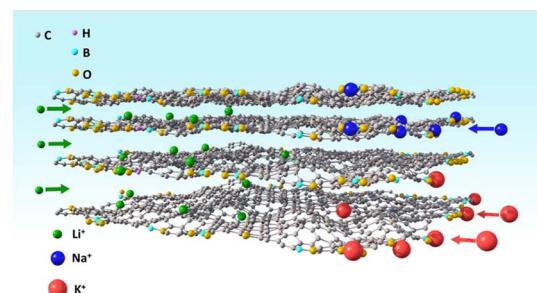
Lin Chen, Yirou Du, Yuhui Xie,\* Guowei Jia, Yuanzhi Zhu, Dong Feng, Yang Meng, Yi Mei and Delong Xie\*



25749

**Correlating the mechanism, kinetics, and SEI formation of a boron-doped graphene anode for high-performance alkali ion batteries**

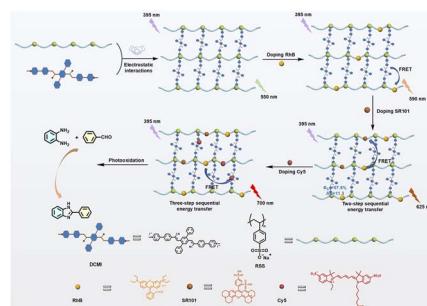
Surishi Vashishth, Ujjwal Vidyarthi, Abhishek Garg, Swaraj Servottam and M. Eswaramoorthy\*



25762

**Polyelectrolyte matrix-enabled multi-step energy transfer light-harvesting system for enhanced photocatalytic benzimidazole synthesis**

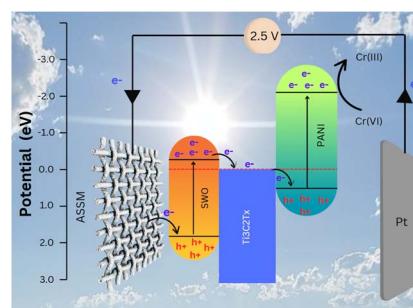
Man Jiang, Rong-Zhen Zhang, Ning Han,\* Hui Liu and Ling-Bao Xing\*



25769

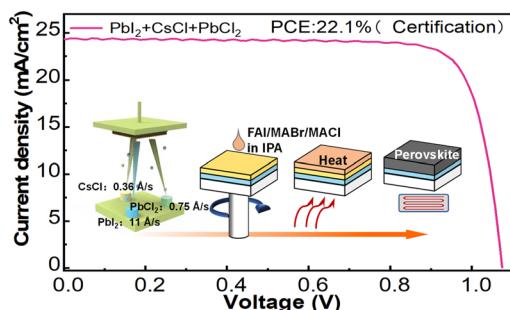
**A SnWO<sub>4</sub>/Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub>/polyaniline heterojunction photoelectrode for Cr(vi) detoxification: mechanism investigation by XPS analysis and energy efficiency considerations**

A. Ghamoushi, S. Hajati,\* R. Amrollahi,\* K. Dashtian, M. Keyhan and J. Toth



## PAPERS

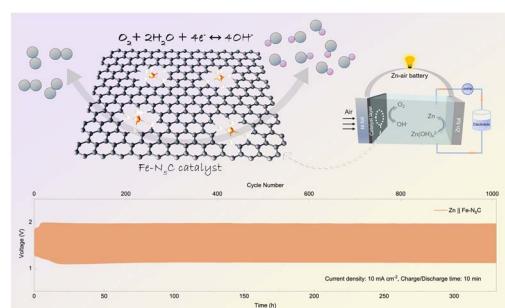
25782



### Combined evaporation-solution methodology for high-efficiency perovskite solar cells with exceptional reproducibility

Qinrong Luo, Maoyuan Wu, Haoyang Zhang, Mingzhu He, Shaohang Wu,\* Huilin Tan, Jinhai Yang, Kai Sun, Zhen Wang,\* Huidong Yang\* and Yaohua Mai

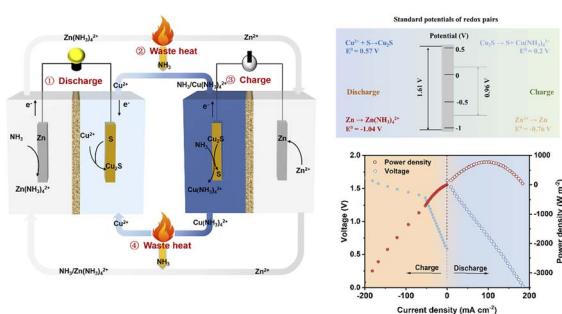
25790



### Regulation of the d band center and geometric distortion via an axial nitrogen strategy of the Fe–N–C oxygen electrocatalyst for a Zn–air battery

Yao Lu, Xiong Du, Shudong Chen, Hao Cheng, Zheng Li, Mengran Wang and Zhongliang Tian\*

25804



### Cost-effective thermoelectric conversion from low-grade heat using a bimetallic sulfur-based thermally regenerative ammonia battery

Siqi Hao, Minghan Wu, Yichao An, Kun Tong, Yu Shi,\* Wei Yang, Jingjing Bao, Licheng Sun, Liang Zhang,\* Min Du and Zhengyu Mo

25815



### Biodegradable starch-based hydrogel as a multifunctional SEI for ultra-stable and flexible zinc-ion batteries

Zinan Wang, Tianxu Ji, Qilin Zhang, Peng Wang,\* Xiaoyu Yang, Shuo Zhang, Yuhang Jin, Xiaolong Fan, Jiaxuan Zhang, Wei Duan, Ying Yue, Yang Ju and Yunpeng Liu

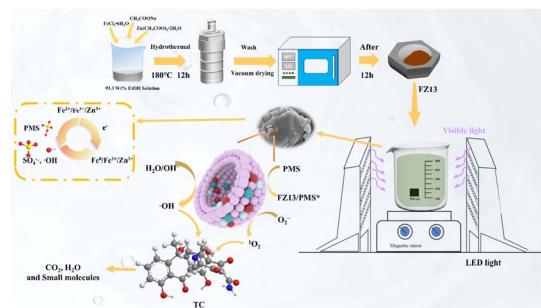


## PAPERS

25829

## Interfacial engineering of Fe–O–Zn bonds in heterojunction photocatalysts: synergistic visible light PMS activation and electron transfer efficiency enhancement

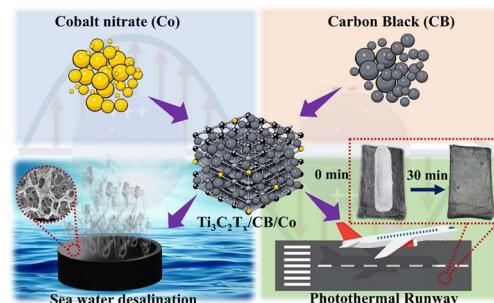
Peng Chen, Yuqing Zhao, Chenyu Li,\* Xiaoqi Chen and Jingfeng Wang\*



25842

## Dual-functional intercalated $\text{Ti}_3\text{C}_2\text{T}_x$ optothermic materials for water desalination and runway ice removal

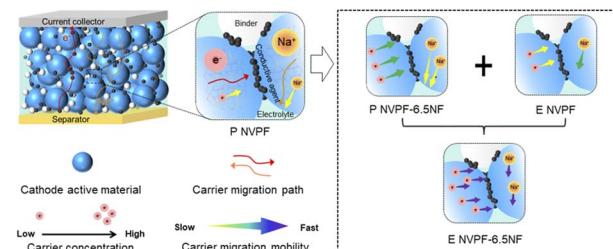
Satheesh kumar Balu, Sijie Cheng, Ruimin Xing and Shanhui Liu\*



25855

## High-rate stability of $\text{Na}_3\text{V}_2(\text{PO}_4)_2\text{F}_3$ sodium-ion cathode materials enabled by an entropy-increasing strategy

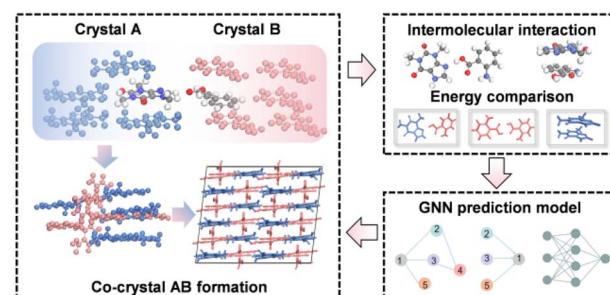
Peifeng Wang, Zhuohui Sun, Kai Zhang, Hongwei Zhang, Xianghua Yao and Youlong Xu\*



25865

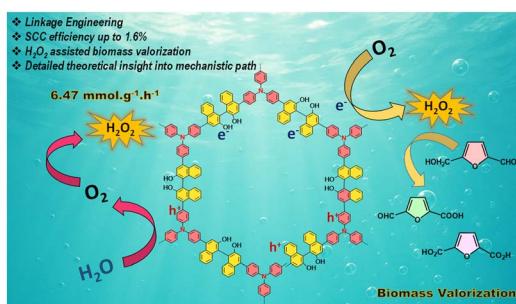
## Graph-based intermolecular interaction prediction enables rational design of co-crystals

Xiurong Yang, Ying Wang, Linhu Pan, Ruihui Wang, Yi Wang, Honglei Xia, Siwei Song\* and Qinghua Zhang\*



## PAPERS

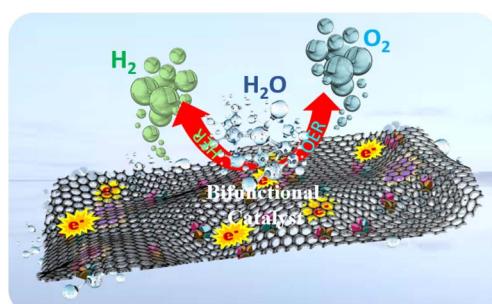
25878



## Efficient exciton dissociation in isomeric BINOL-based porous polymers for sacrificial agent-free $H_2O_2$ photosynthesis and biomass valorization

Flora Banerjee, Sougata Saha, Soumitra Sau, Shubhangi Majumdar, Shiladitya Roy, Pramit K. Chowdhury, Swapan K. Pati and Suman Kalyan Samanta\*

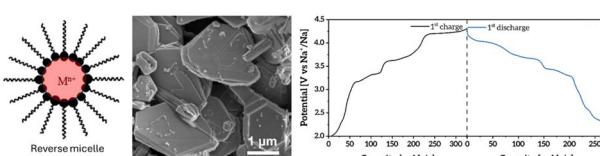
25892



## A biomass derived jute carbon integrated FeCoNi alloy as a robust catalyst for alkaline water splitting

Sobia Dilpazir, Yuda Prima Hardianto, Muhammad Imran, Mohd. Yusuf Khan, Md. Abdul Aziz, Abduljamali Amao and Abuzar Khan\*

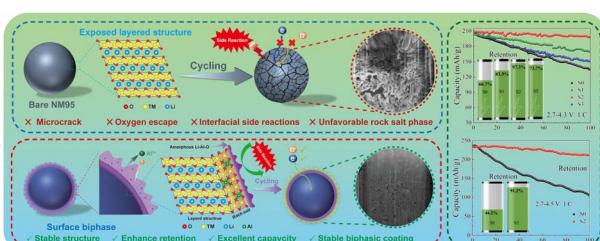
25904



## Boosting the capacity of Mg-stabilized $Na_{0.67}Ni_{0.27}Mg_{0.06}Mn_{0.66}O_2$ cathodes via particle size control in an emulsion-based synthesis route

Saúl Rubio, Eva M. Pérez-Soriano, Cristina Arévalo, Xiaoqiong Du, Xuyun Guo, Francisco J. García-García, Isabel Montealegre-Meléndez, Ana M. Beltrán, Valeria Nicolosi and Juan G. Lozano\*

25914



## Rational engineering of amorphous coating/rock-salt phase dual-coupling for overcoming the capacity–stability conflict in Co-free Ni-rich cathodes

Zhenni Wang, Wenqi Zhao, Sajing Wang, Wenjun Lu, Houguang Wen, Peng He, Maolin Zhang\* and Xiaofei Sun\*

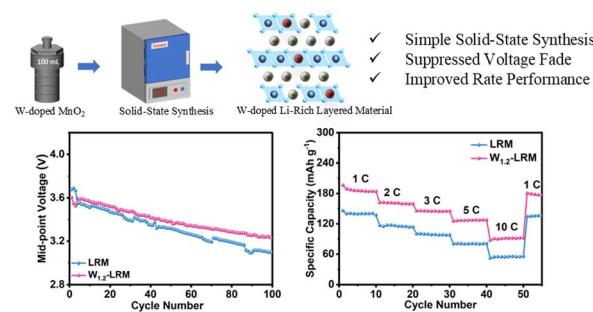


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25926

**Boosting the rate performance of lithium-rich cathode materials with W-doping**

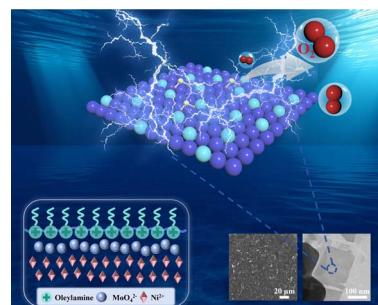
Jing-Zhe Wan, Chao Ma, Liang Gao, Jie-Sheng Chen and Kai-Xue Wang\*



25934

**Room-temperature high-efficiency electrocatalysis in two-dimensional ultrathin amorphous Ni-Mo-O nanosheets**

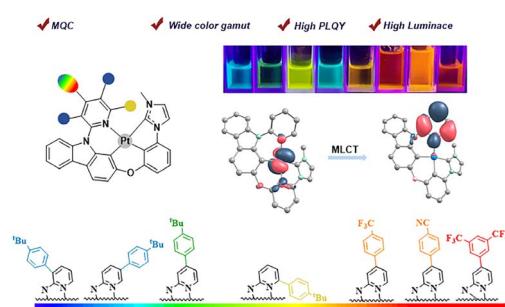
Junyuan Yang, Gong Chen, Wei Feng, Zehua Guo, Long Gu, Zheng Li and Yunhe Zhao\*



25943

**Wide-colour gamut emission tuning of platinum(II) complexes via multi-quantum state coherence**

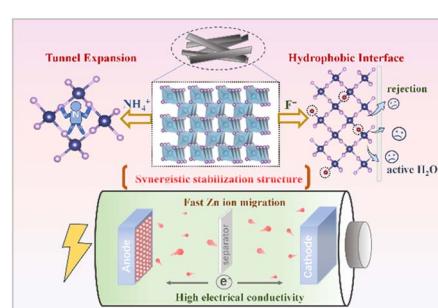
Wei Sun, Yang Zhou, Kai Feng, Rongjie Li, Qian Wang, Xiao Liu, Yibo Shi, Wei-Hai Fang and Xuebo Chen\*



25954

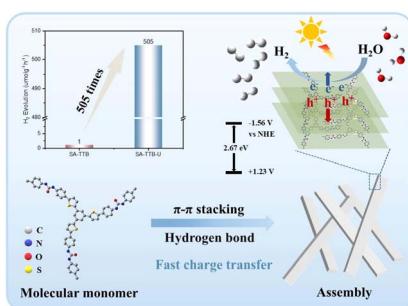
**Dual-ion synergy in boosting reaction kinetics and conductivity of a VO<sub>2</sub>·xH<sub>2</sub>O cathode for stable zinc-ion batteries**

Ying Sha, Jianshu Wang, Chaoxuan Wang, Zeqi Liu, Hao Wang and Lei Qian\*



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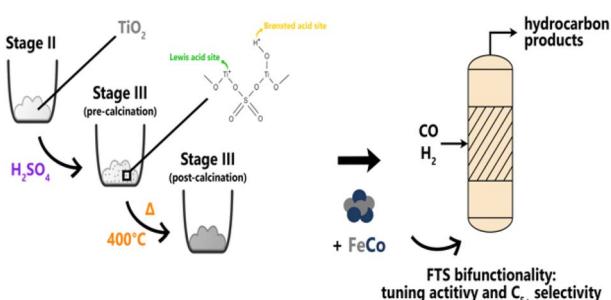
25964



### Supramolecular nanobelts assembled from tri-urea-armed thiophene derivatives as efficient metal-free photocatalysts for hydrogen evolution

Xiaowei Li, Fanshen Geng, Yali Song, Jingxin Jian, Xuewang Gao, Haiying Jiang, Ning Wang and Cheng-Bo Li\*

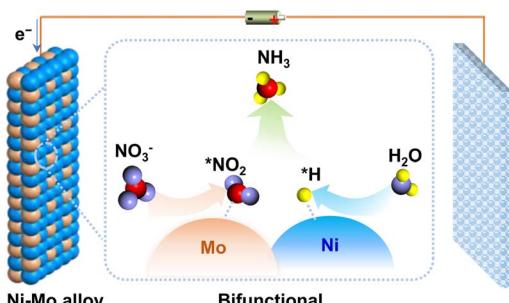
25974



### Design of bifunctional bimetallic Fischer–Tropsch synthesis (FTS) catalysts: acid functionalization of $\text{TiO}_2$ support for enhanced product selectivity

Luis C. Caballero, J. Paulo L. Perez and Michael M. Nigra\*

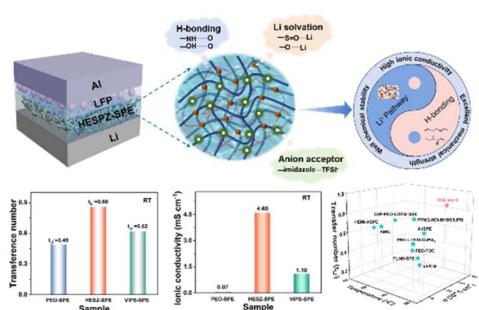
25991



### Electrocatalytic nitrate reduction to ammonia using a bifunctional Ni–Mo alloy catalyst

Miao Zhao, Ruizhi Duan, Zicong Zhang, Qi Mao, Qingnan Wang, Yiyang Zhou, Xun Wang, Chunmei Ding\* and Can Li\*

25998



### Intermolecular chemistry in high-entropy solid polymer electrolytes enabling room temperature solid-state lithium metal batteries

Hui-Juan Guo, Rui Shu, Yixin Xie, Xueying Wang, Haonan Wu, Yuexian Song, Jianxin Tian, Fanpeng Cheng, Yangyang Guo,\* Tingyu Zhu, Lijuan Shi,\* Rui Wen and Qun Yi\*



## PAPERS

26009

**Doping and thermoelectric properties of the zero-dimensional inorganic halide perovskite derivative,  $\text{Cs}_3\text{Cu}_2\text{I}_5$**

Ceyla Asker, Candida Pipitone, Federica Ursi, Kan Chen, Antonio Gaetano Ricciardulli, Eugenio S. Suena Galindez, Sally Luong, Paolo Samori, Mike Reece, Antonino Martorana, Francesco Giannici and Oliver Fenwick\*

