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Journal of Materials Chemistry A

Materials for energy and sustainability

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IN THIS ISSUE

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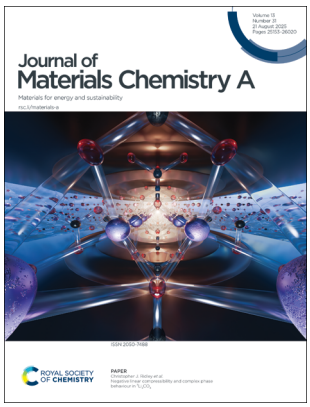

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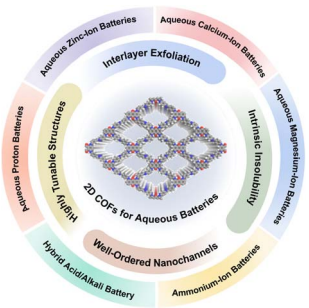
See Myong Yong Choi *et al.*, pp. 25345–25355. Image reproduced by permission of Myong Yong Choi from *J. Mater. Chem. A*, 2025, **13**, 25345.

REVIEWS

25174

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

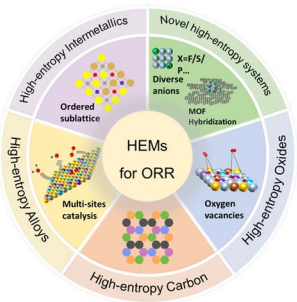
Xiaoli Yan,* Manrong Li, Lu Zhang, Yingna Chang, Tianxue Wan, Jindi Wang, Kefan Song, Yu Liu, Yuzhen Sun, Huayu Wu, Rong Xing* and Heng-Guo Wang*



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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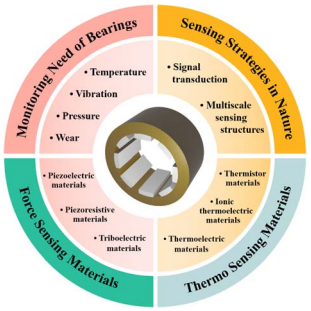
REVIEWS

25213

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

Dingyuan Zhao, Zhiwei Guo* and Chengqing Yuan*



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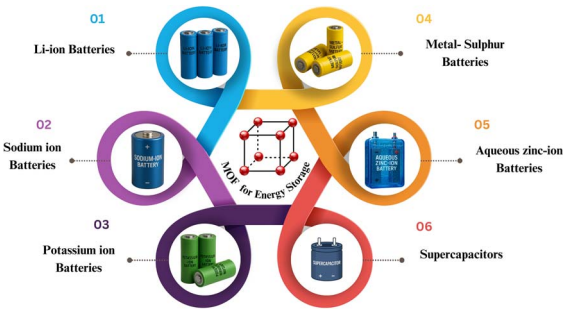
Advances in metal–organic framework-based materials for sustainable energy solutions

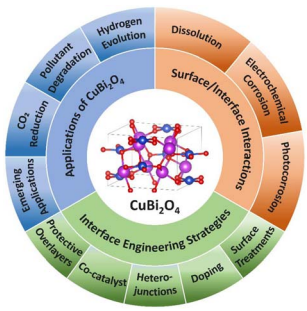
Muhammad Altaf Nazir,* Sami Ullah, Asif Jamil, Ibrahim A. Shaaban, Lala Gurbanova, Karim Khan, Syed Shoaib Ahmad Shah* and Shu-Juan Bao*



25304

Interfacial chemistry of $CuBi_2O_4$ in aqueous media: engineering strategies for energy and environmental applications

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

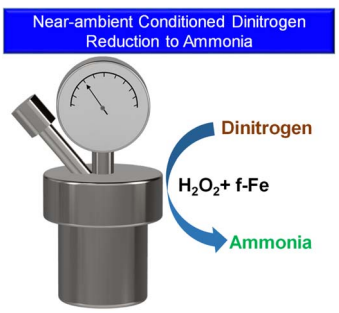


COMMUNICATIONS

25316

Hydrogen peroxide driven dinitrogen reduction to ammonia

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



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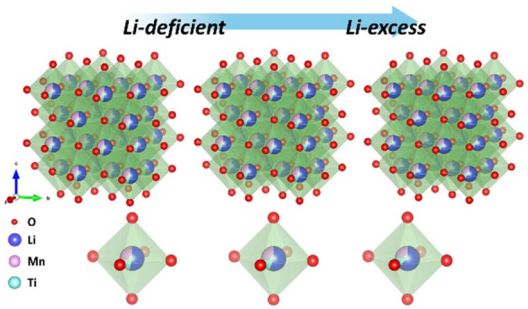
COMMUNICATIONS

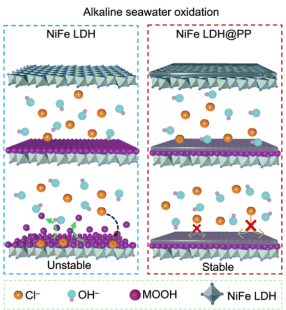
25321



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, Yaxin 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

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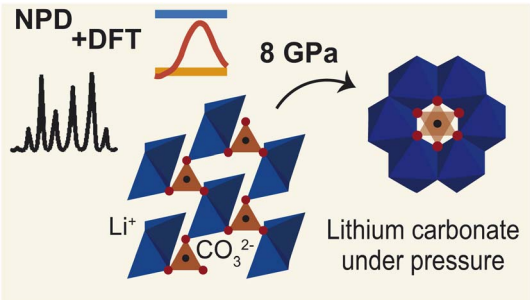
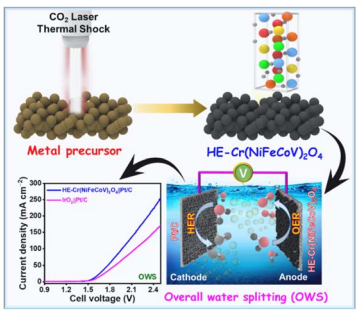


Negative linear compressibility and complex phase behaviour in $^{7}Li_2CO_3$

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 $Cr(NiFeCoV)_2O_4$ catalysts *via* CO_2 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*

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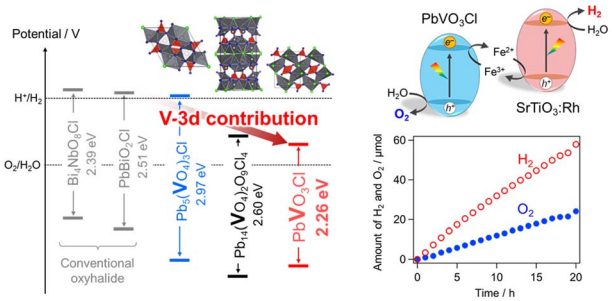
25356

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

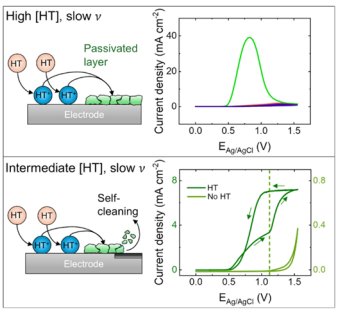
Hajime Suzuki,* Ryuki Tomita, Yusuke Ishii, Osamu Tomita, Akinobu Nakada, Akinori Saeki and Ryu Abe*



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*



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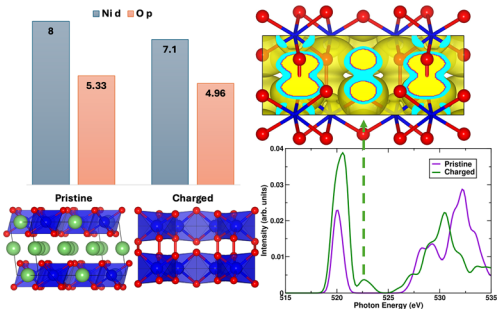
Demystifying charge-compensation mechanisms and oxygen dimerization in Li-rich Li_2NiO_3 cathodes

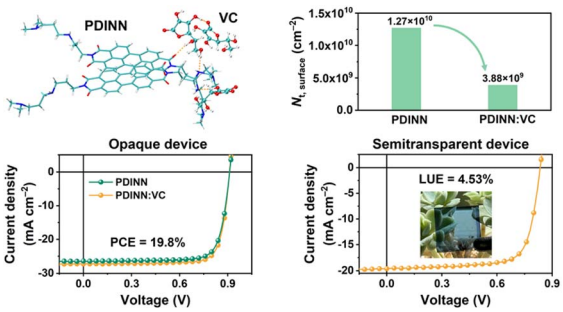
Hrishit Banerjee,* Clare P. Grey and Andrew J. Morris



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*



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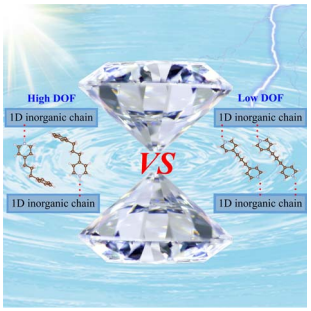

Crucial impact of degrees of freedom on the pressure-induced optical properties of water-stable 1D perovskites

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

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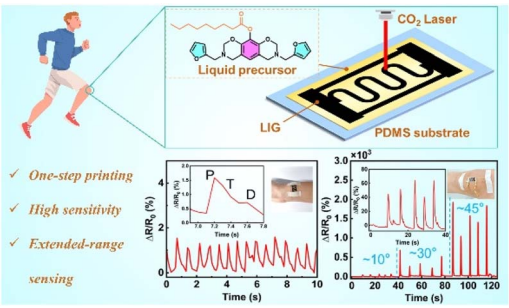

A laser-induced graphene/PDMS composite sensor with a dual structure enabling high-sensitivity under micro-strain and extended-range sensing

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

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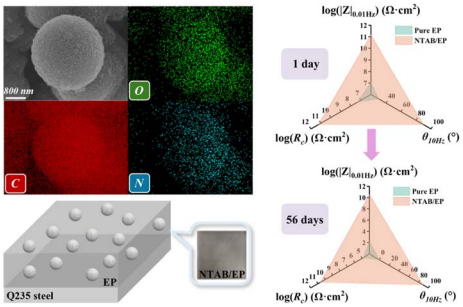

Achieving superior anti-corrosion performance with spherical organic additives and synergistic barrier passivation mechanisms

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

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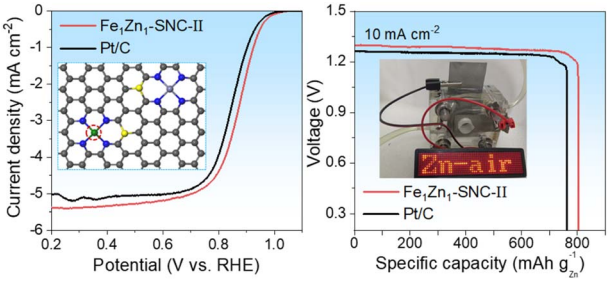

Atomically dispersed Fe/Zn synergy in sulfur-modified nitrogen-doped carbon for boosting oxygen reduction activity

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

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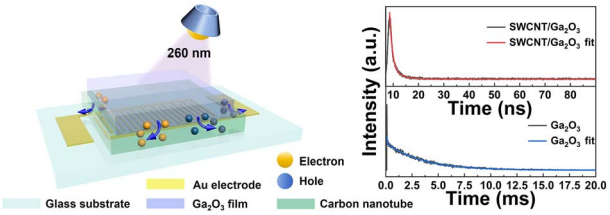
Engineered s-SWCNT network/a-Ga_2O_3 heterointerface for enhanced deep ultraviolet photodetection

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



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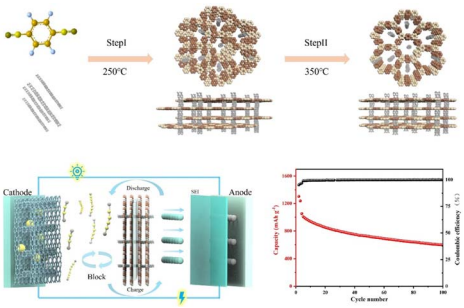
Enhancing the catalytic conversion of polysulfides utilizing a covalent organic framework–carbon nanotube interlayer

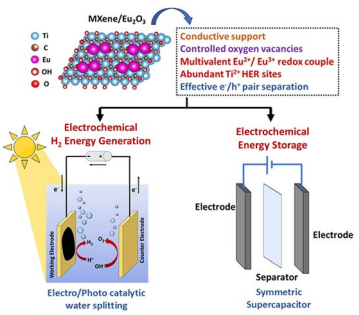
Bowen Sun, Feng Huo,* Chongchong Zhao, Jinhai He, Jiaojiao Xue, Zhiqiang Sun, Jiayao Wu, Xuntao Wang, Jiali Wang, Ruizheng Zhao* and Zixu Sun*



25457

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

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



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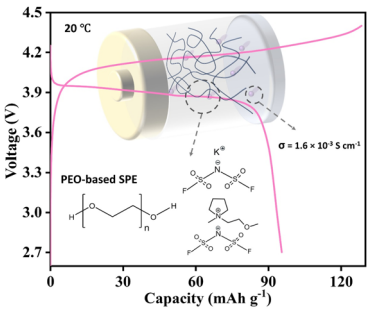
Polymer electrolytes for potassium batteries: incorporating ionic liquids to enhance the room temperature ionic conductivity

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



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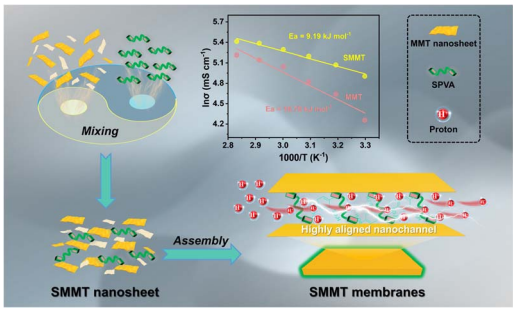

A dual-constrained assembly strategy of highly aligned two-dimensional montmorillonite membranes for efficient proton transport

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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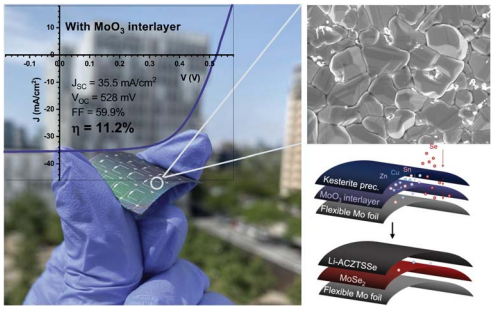

Strategies for back contact engineering in high-performance flexible kesterite solar cells

Carla Gobbo,* Yuancai Gong,* Alex Jimenez-Arguijo, Giorgio Tseberlidis, Vanira Trifiletti, Claudia Malerba, Matteo Valentini, Pau Estarlich, Elaine Armelin, Sonia Lanzalaco, Riccardo Po, Simona Binetti and Edgardo Saucedo

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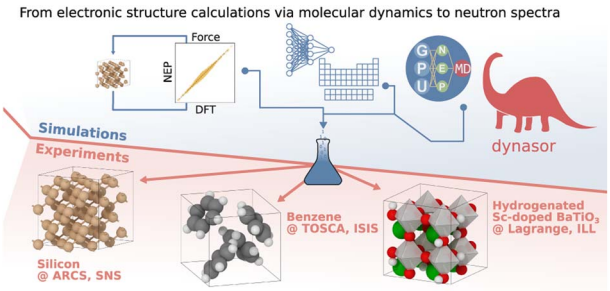

Predicting neutron experiments from first principles: a workflow powered by machine learning

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

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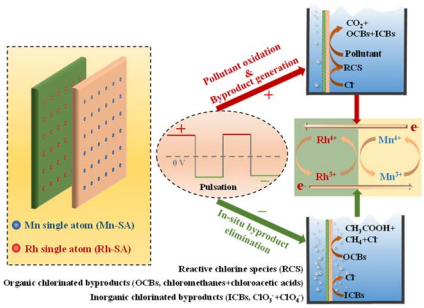

Tuning valence-variable single atomic metal for efficient antibiotic degradation and *in situ* chlorinated byproduct elimination under current pulsation

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

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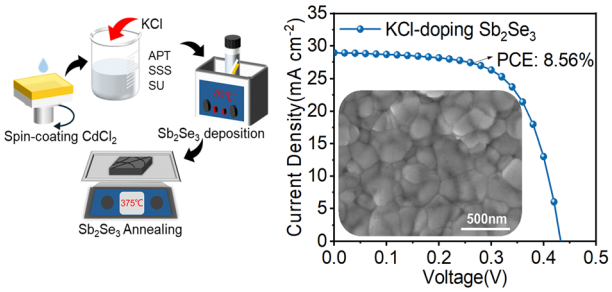
High-performance antimony selenide solar cells enabled by *in situ* potassium doping

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*



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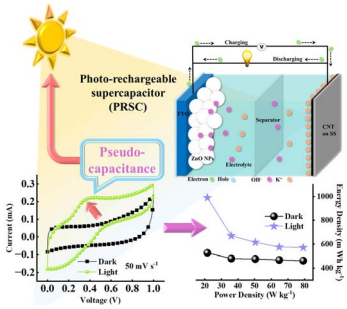
Light-driven enhancement in the pseudocapacitance of nanosized ZnO particles and carbon nanotube-based photo-rechargeable supercapacitors

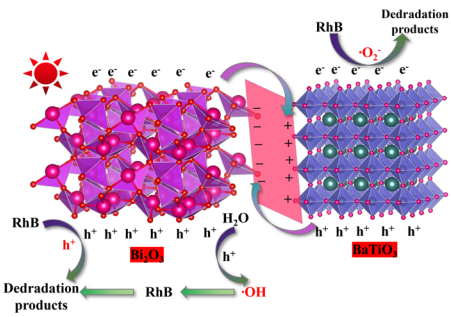
Priyanka Saini, Jitendra Kumar Yadav, Bharti Rani and Ambesh Dixit*



25559

An innovative S-scheme β-Bi_2O_3/$BaTiO_3$ heterojunction nanocomposite with enhanced stability and photocatalytic performance

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



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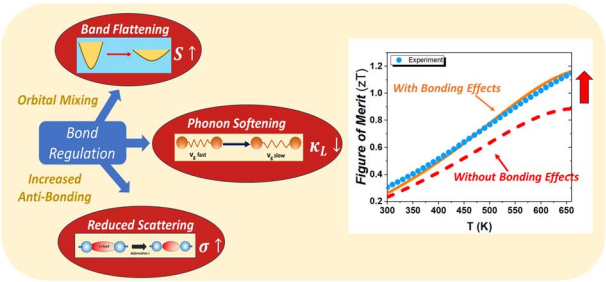
Bonding mediated coupling of electron band mass and phonon group velocity: an effective strategy to improve the thermoelectric performance of solid solutions

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



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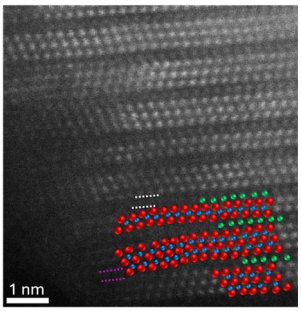
25590



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

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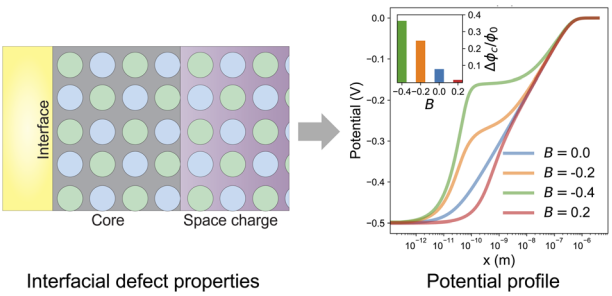
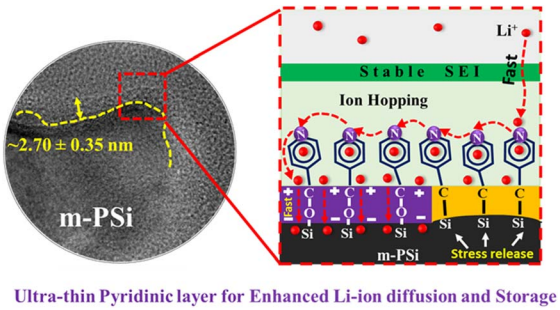


A unified and consistent electrical double layer model for the treatment of core and space charge layers in solid electrolytes

Zeeshan Ahmad*

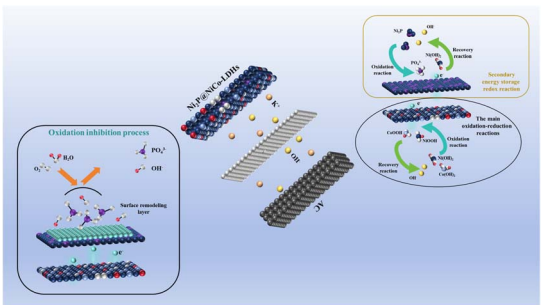
25609



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*

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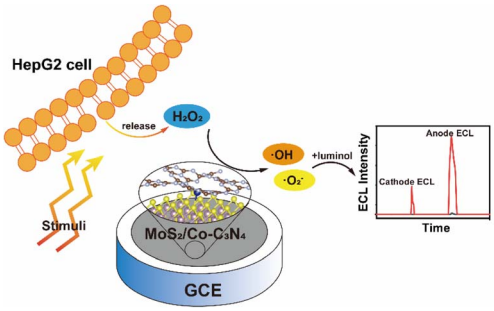
25644

Single-atom catalysts integrated with semiconductors for constructing a dual-potential electrochemiluminescence sensor for intracellular H_2O_2 detection

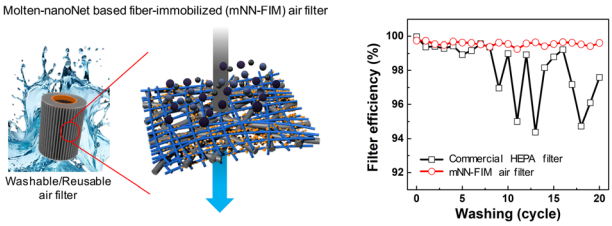
Yiran Ying, Tianyou Chen, Arzugul Ablimit, Chan Zhang, Bing Sun, Jing Wu* and Wu Liu*



25655

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

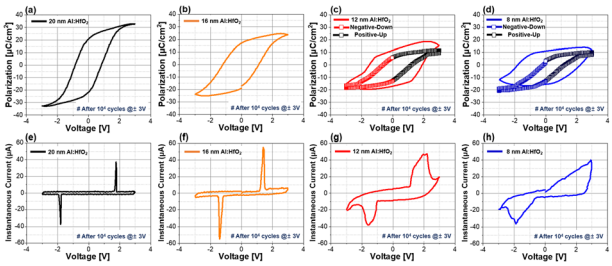
Taekyung Lim, Sang-Mi Jeong, Jonguk Yang, Keumyoung Seo, Hyunah Park, Shinji Han, Chaeyoon Kim, Hee Sung Seo* and Sanghyun Ju*



25673

Low coercive field in quasi-epitaxial Al-doped HfO_2 films for energy-efficient ferroelectric memories

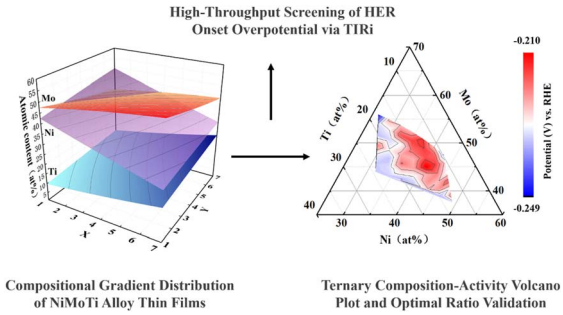
In Pyo Hong, Rui He, Thi My Huyen Nguyen, Jae ho Park, Min Joon Kim and Chung Wung Bark*



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*



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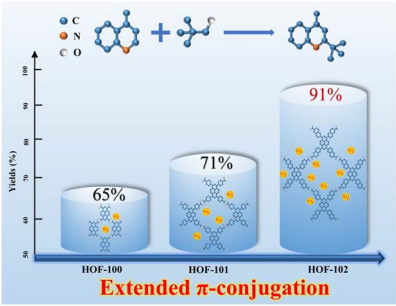
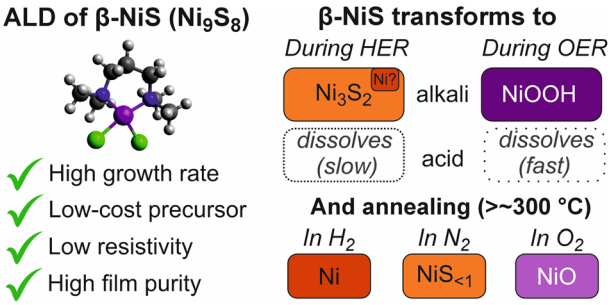


Modulating photocatalytic decarbonylative Minisci alkylation through conjugation engineering in pyrene-based hydrogen-bonded organic frameworks

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

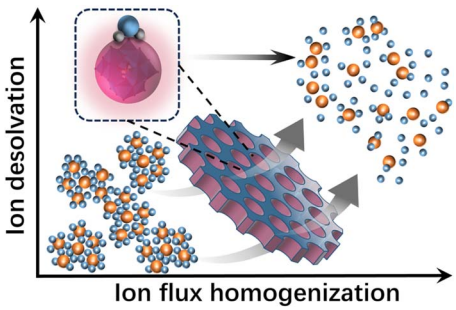
25703



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*

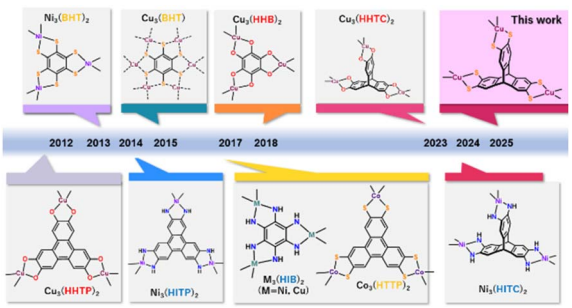
25715



Coupled ion desolvation and nucleation control for stable zinc anodes enabled by a polyoxometalate-crosslinked nanocellulose separator

Yilin Zhang, Chenyu Wang, Xuan Li, Yuhuan Ye, Fan Chen, Guoli Ding, Zhiguang Guo, Lei Li, Jun Lei, Huadong Huang, Hongli Yang,* Shengyang Zhou* and Zhongming Li

25724



Two-dimensional conductive metal–organic framework with 2,3,6,7,14,15-triptycenehexathiol (TCHT) ligand: synthesis, structure, electrical conductivity and CO_2RR activity

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

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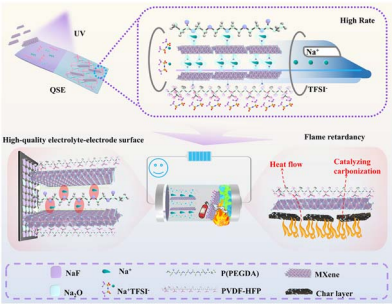
25732

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

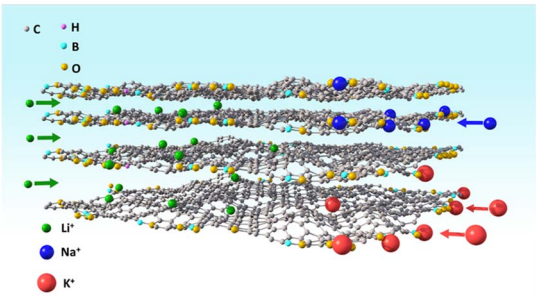
Lin Chen, Yirou Du, Yuhui Xie,* Guowei Jia, Yuanzhi Zhu, Dong Feng, Yang Meng, Yi Mei and Delong Xie*



25749

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

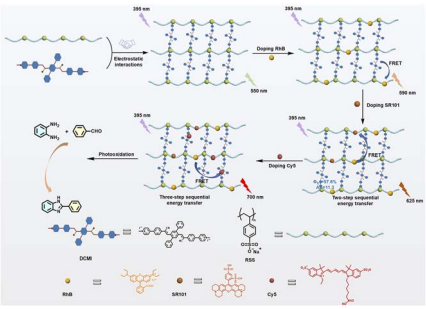
Surishi Vashishth, Ujjwal Vidyarthi, Abhishek Garg, Swaraj Servottam and M. Eswaramoorthy*



25762

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

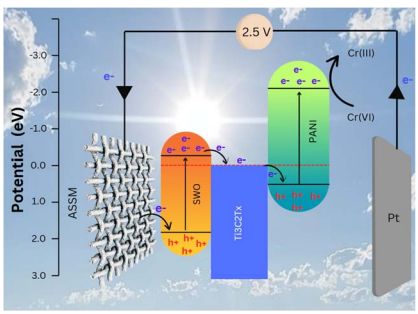
Man Jiang, Rong-Zhen Zhang, Ning Han,* Hui Liu and Ling-Bao Xing*



25769

A $SnWO_4/Ti_3C_2T_x$/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



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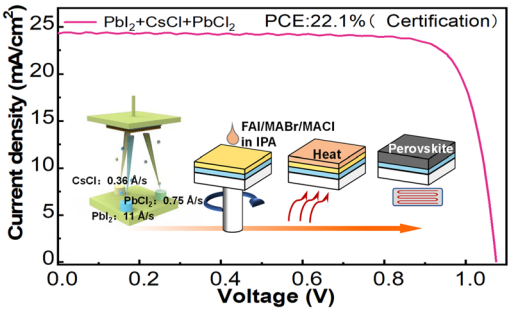
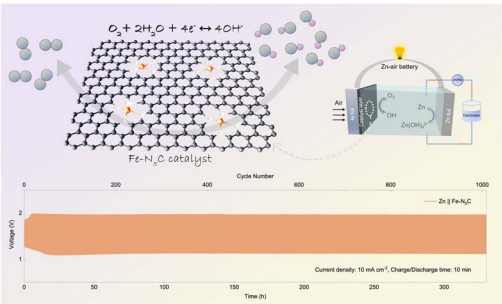


Combined evaporation-solution methodology for high-efficiency perovskite solar cells with exceptional reproducibility

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

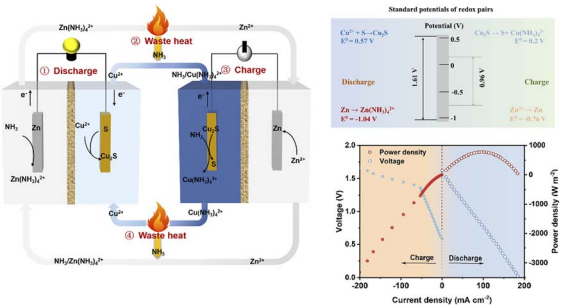
25790



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*

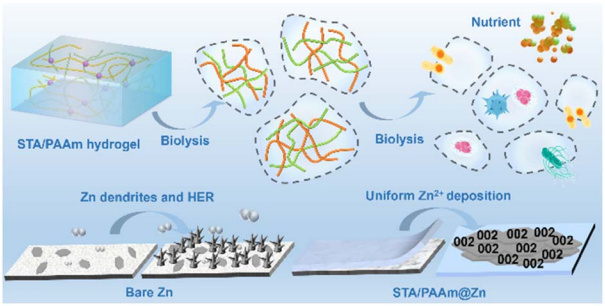
25804



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

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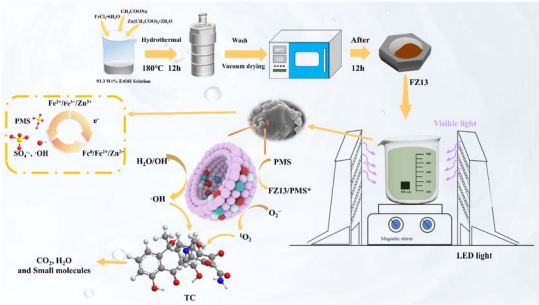
25829

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

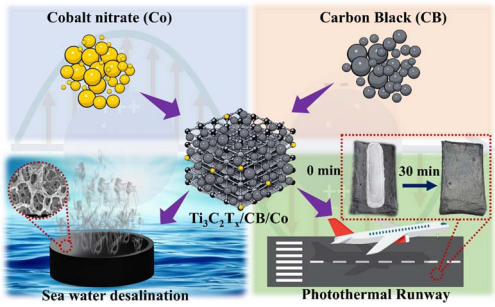
Peng Chen, Yuqing Zhao, Chenyu Li,* Xiaoqi Chen and Jingfeng Wang*



25842

Dual-functional intercalated $Ti_3C_2T_x$ optothermic materials for water desalination and runway ice removal

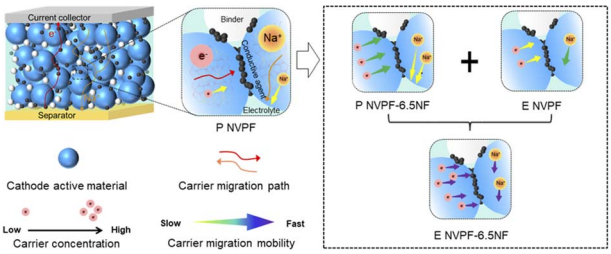
Satheesh kumar Balu, Sijie Cheng, Ruimin Xing and Shanhu Liu*



25855

High-rate stability of $Na_3V_2(PO_4)_2F_3$ sodium-ion cathode materials enabled by an entropy-increasing strategy

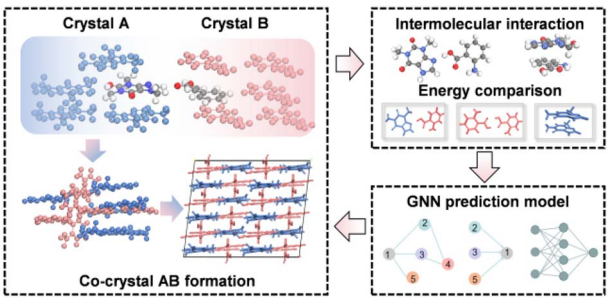
Peifeng Wang, Zhuohui Sun, Kai Zhang, Hongwei Zhang, Xianghua Yao and Youlong Xu*



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*



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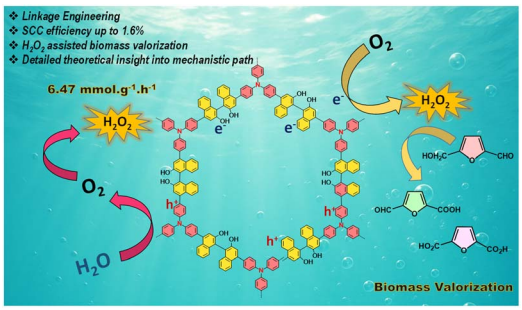
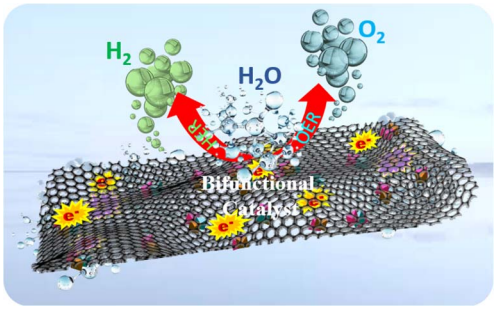


Efficient exciton dissociation in isomeric BINOL-based porous polymers for sacrificial agent-free H_2O_2 photosynthesis and biomass valorization

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

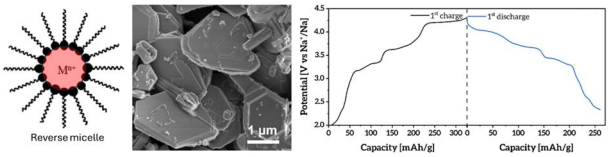
25892



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, Abduljamiu Amao and Abuzar Khan*

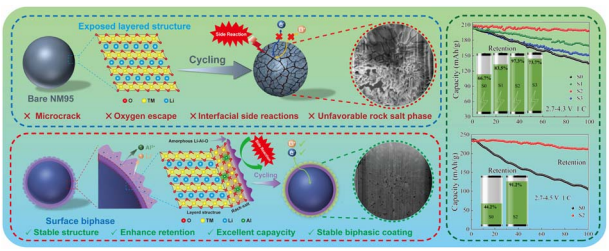
25904



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. Garcia-Garcia, 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, Saijing Wang, Wenjun Lu, Houguang Wen, Peng He, Maolin Zhang* and Xiaofei Sun*

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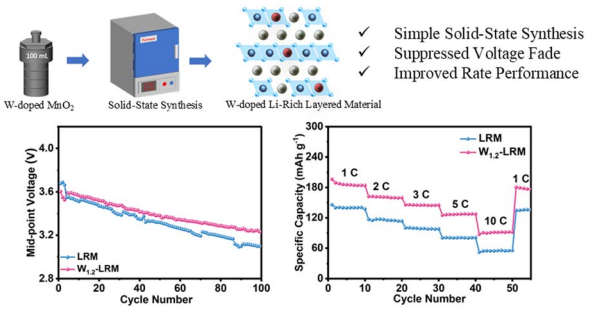
25926

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

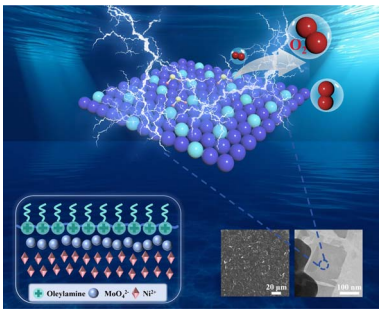
Jing-Zhe Wan, Chao Ma, Liang Gao, Jie-Sheng Chen and Kai-Xue Wang*



25934

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

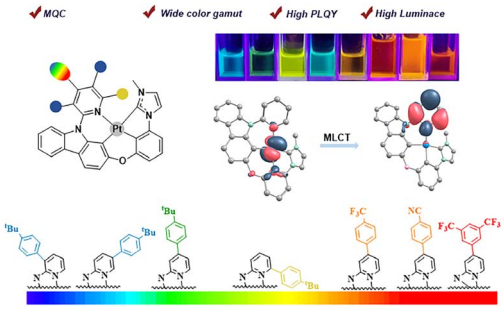
Junyuan Yang, Gong Chen, Wei Feng, Zehua Guo, Long Gu, Zheng Li and Yunhe Zhao*



25943

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

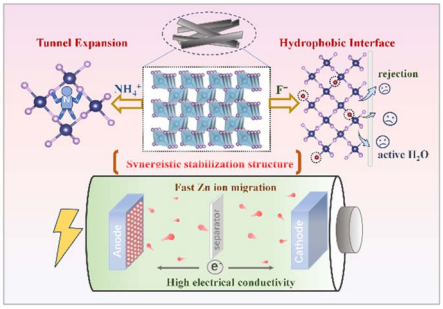
Wei Sun, Yang Zhou, Kai Feng, Rongjie Li, Qian Wang, Xiao Liu, Yibo Shi, Wei-Hai Fang and Xuebo Chen*



25954

Dual-ion synergy in boosting reaction kinetics and conductivity of a $VO_2 \cdot xH_2O$ cathode for stable zinc-ion batteries

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



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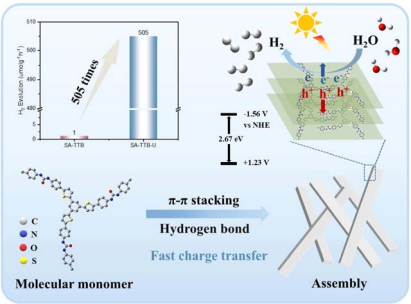
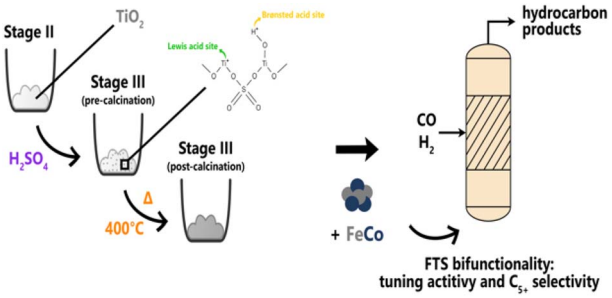


Supramolecular nanobelts assembled from tri-urea-armed thiophene derivatives as efficient metal-free photocatalysts for hydrogen evolution

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

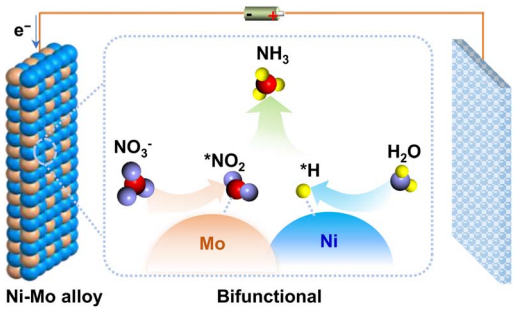
25974



Design of bifunctional bimetallic Fischer–Tropsch synthesis (FTS) catalysts: acid functionalization of TiO_2 support for enhanced product selectivity

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

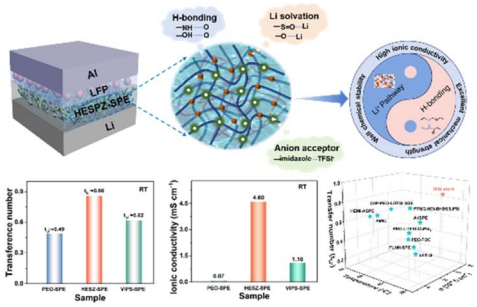
25991



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, Yaxin Xie, Xueying Wang, Haonan Wu, Yuexian Song, Jianxin Tian, Fanpeng Cheng, Yangyang Guo,* Tingyu Zhu, Lijuan Shi,* Rui Wen and Qun Yi*

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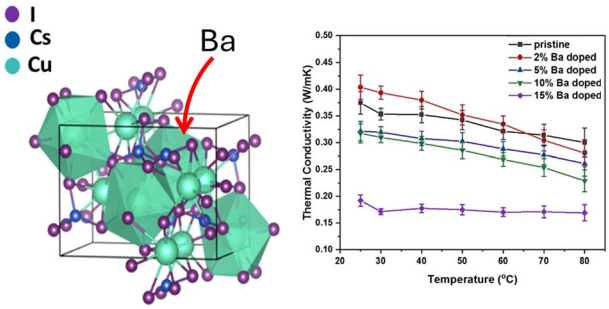
26009

Doping and thermoelectric properties of the zero-dimensional inorganic halide perovskite derivative, $Cs_3Cu_2I_5$

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



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