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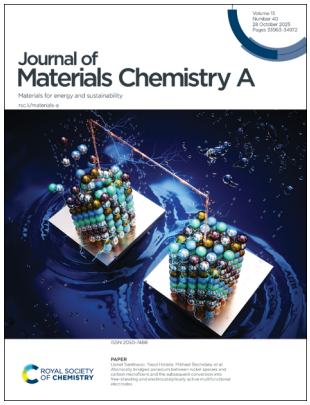
IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 13(40) 33963–34972 (2025)



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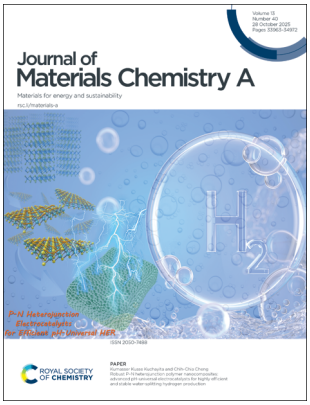
See Lionel Santinacci, Yaovi Holade, Mikhael Bechelany *et al.*, pp. 34231–34248. Image reproduced by permission of CNRS/European Institute of membranes from *J. Mater. Chem. A*, 2025, **13**, 34231.



Inside cover
See Kumasser Kusse Kuchayita and Chih-Chia Cheng, pp. 34249–34259. Image reproduced by permission of Chih-Chia Cheng from *J. Mater. Chem. A*, 2025, **13**, 34249.

EDITORIAL

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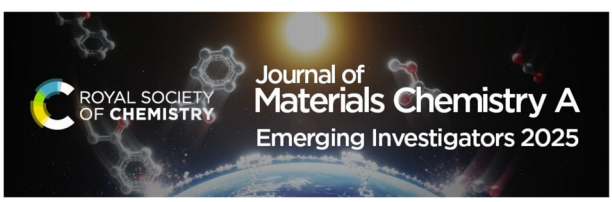

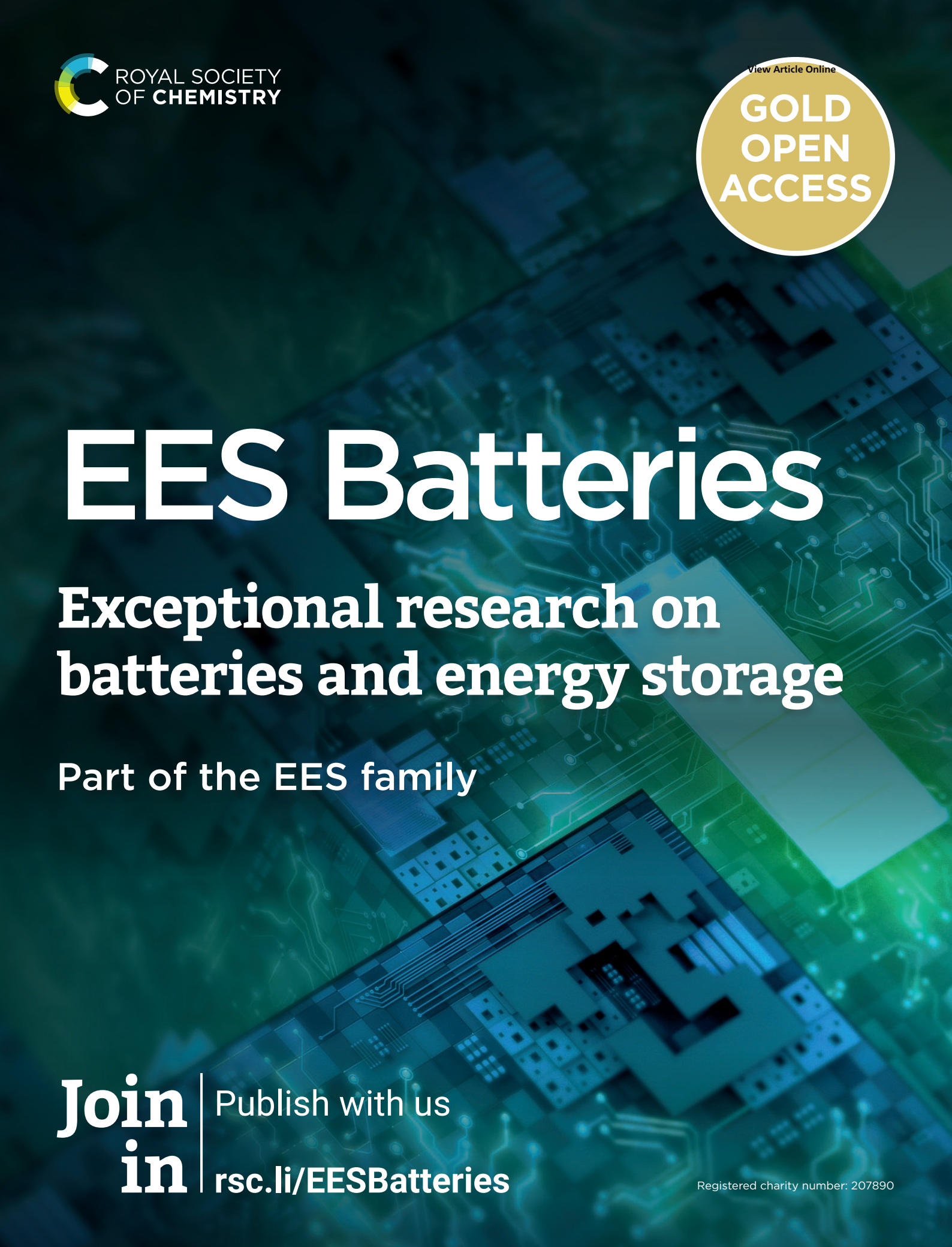
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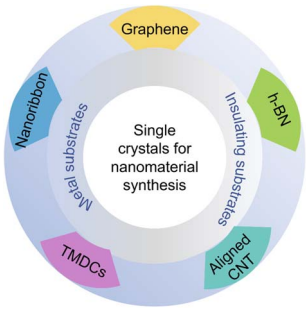

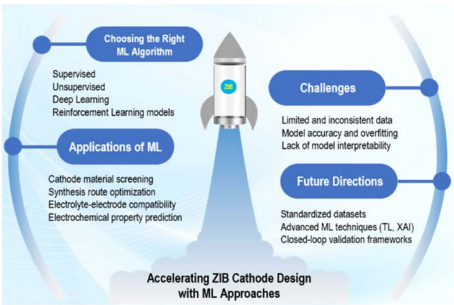

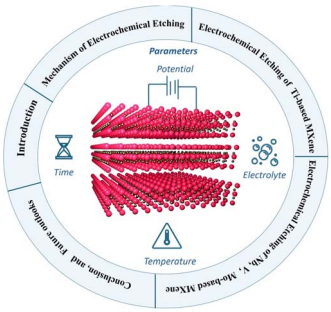

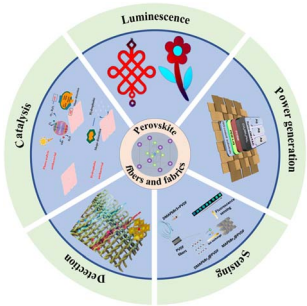

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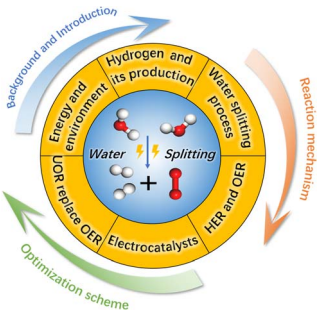

Advancements in water electrolysis: enhancing hydrogen and oxygen production efficiency through electrocatalyst design and urea oxidation

Xuze Tang, Yuemin Xin, Renhong Chen, Xuefeng Ren,* Liguo Gao, Hao Xu,* Peixia Yang and Anmin Liu*

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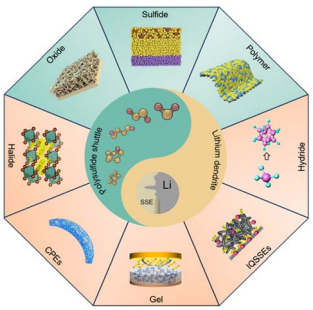

Taming polysulfide shuttle and lithium dendrites in lithium–sulfur batteries *via* all-/quasi-solid-state electrolytes: recent progress and future prospects

Chuju Wang, Hao Tan, Xiaozhen Li, Zishun Lin, Jing Xu, Tao Mei, Xianbao Wang,* Guoxiu Wang* and Yi Chen*

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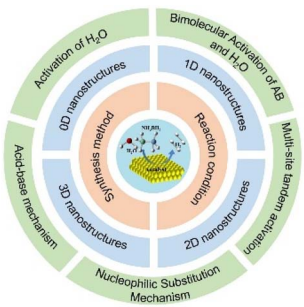

Research progress of heterogeneous catalysts with different dimensional supports for catalytic hydrolysis of ammonia borane

Chengming Wang, Hao Ma, Shuling Liu, Ning Duan, Huanhuan Zhang, Zhuoyao Wang, Wei Lv, Xingyuan Fu, Yanyan Liu and Baojun Li*

COMMUNICATION

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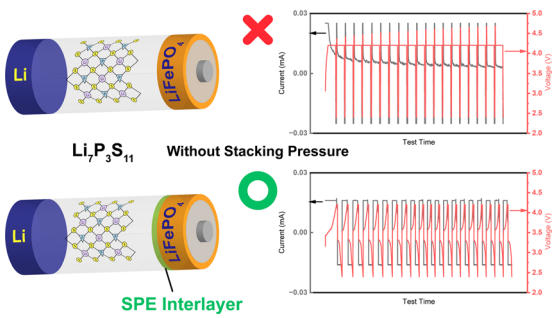

Synergy of metal halide doping and a polymeric interface enables improved electrochemical performance of all solid-state Li batteries

Madan Bahadur Saud, M. Bilal Faheem, Hansheng Li, Haining Zhang, Bilawal Khan, Samprash Risal, Abiral Baniya, Xinlu Wang, Yuchen Zhang, Ruosi Qiao, Poojan Kaswekar, Ian Dean Hosein, Yeqing Wang, Jr-Hau He, Zheng Fan and Quinn Qiao*

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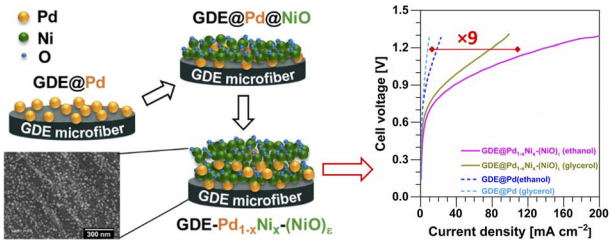
Atomically bridged palladium between nickel species and carbon microfibers and the subsequent conversion into free-standing and electrocatalytically active multifunctional electrodes

Zahra Hagheh Kavousi, Clémence Badie, Vyshnav Kannampalli, Massomeh Ghorbanloo, Qing Wang, Hazar Guesmi, Lionel Santinacci,* Yaovi Holade* and Mikhael Bechelany*



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Kumasser Kusse Kuchayita and Chih-Chia Cheng*

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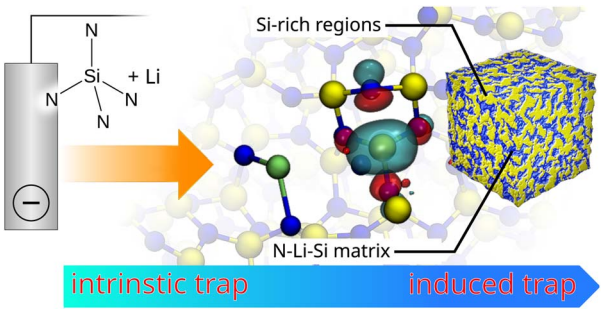
Jonathon Cottom, Lukas Hückmann, Jörg Meyer and Emilia Olsson*



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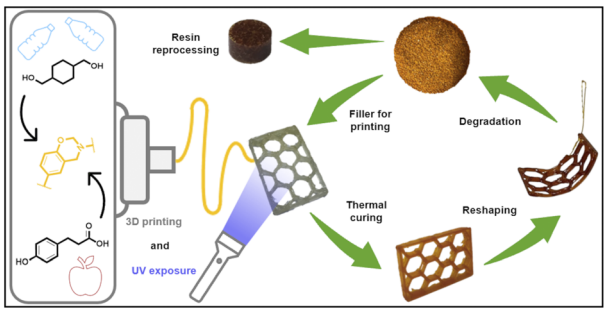
A recyclable, reshapable and UV-curable polybenzoxazine vitrimer enabling closed-loop 3D printing applications

Charles Jehl, Antoine Adjaoud, Ambre Meyer, Vincent Boulic, Channya Hesse, Laura Puchot, Joamin Gonzalez-Gutierrez, Alexander S. Shaplov, Daniel F. Schmidt and Pierre Verge*



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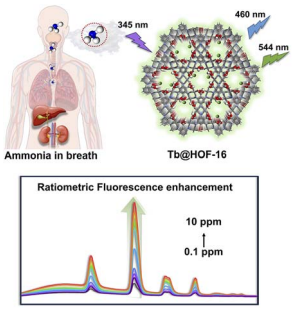
Lanthanide ion-sensitized hydrogen-bonded organic framework as a fluorescent sensing platform for ultra-low concentration breath ammonia detection

Yuxin Wang, Jing Wang, Chao Zhi, Xueqiang Guo, Lifei Yin, Changxiao Li, Jinping Li, Libo Li,* Lixia Ling* and Jia Yao*



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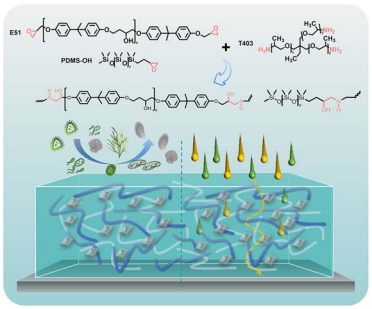
Construction of a photothermal self-healing epoxy coating with anti-fouling and anti-corrosion functions inspired by the hierarchical surface morphology of starfish

Ming-Yang Zhang, Yong-Yin Cui, Hong-Wei Cheng, Jia-Yuan Chen, Ke-Yu Wang, Ting-Yu Zhang, Hui-Jing Li and Yan-Chao Wu*



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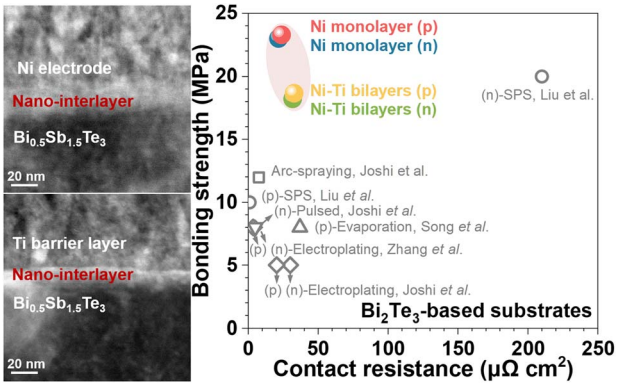
In situ formed nano-interlayer enables robust interface bonding in efficient Bi_2Te_3-based thermoelectric modules

Rui Zhou, Ziyan Li, Shujing Yang, Xuemei Wang, Xinyi Shen, Long Yang, Zhiwei Chen, Juan Chen* and Wen Li*



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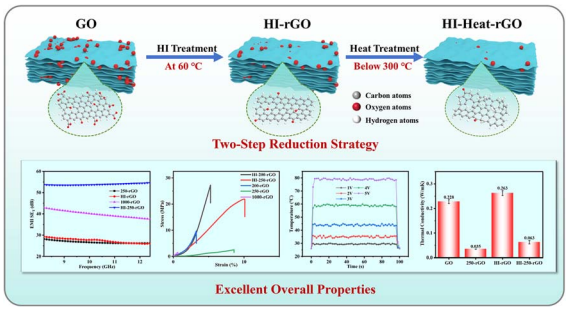
Fabrication of reduced graphene oxide electromagnetic shielding films with excellent comprehensive performance using a two-step reduction strategy

Yufan Wu, Wenhao Liang, Juntao Wu,* Shan Zhang, Yun-Tian Chen, Jiahui Yan, Chengyuan Shang, Xiaobiao Zuo* and Guang-Sheng Wang*



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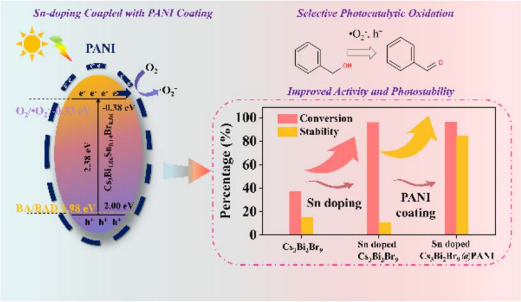

Dual-functional engineering of Sn-doping and polyaniline coating for $Cs_3Bi_2Br_9$ perovskite: boosting its photocatalytic activity and photostability in selective oxidation of benzyl alcohol

Hao Li, Hongxia Yang, Baozhu Tian* and Jinlong Zhang*

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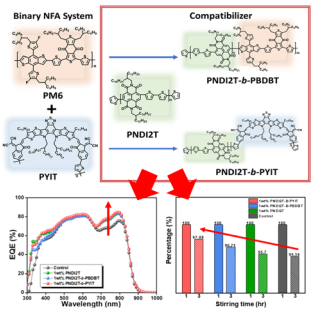

Tailoring block copolymer-type compatibilizers to enhance the performance and processability of inverted all-polymer solar cells

Hsu-Tzu Cheng, Aoto Kato, Yu-Cheng Tseng, Cheng-Yu Yeh, Hao-Wei Yu, Tomoya Higashihara* and Chu-Chen Chueh*

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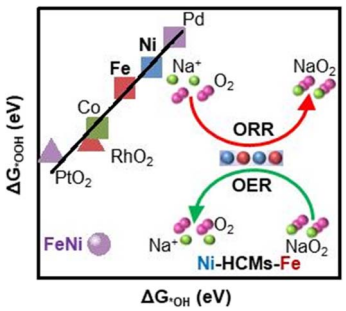

Breaking scaling relations *via* Fe/Ni diatomic catalysts towards highly efficient electrocatalysts for rechargeable Na-air batteries

Wenwen Yin, Jiawei Ma, Yanyan Li, Qing Cheng, Bernt Johannessen,* Fangxi Xie* and Mingmei Wu*

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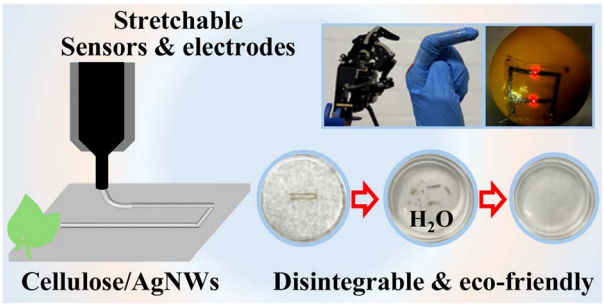

Eco-friendly, flexible and stretchable printed electronics based on a sustainable elastic substrate and ink

Danish Tahir, Xuan Li, Milad Razbin, Krish Singh, Anil R. Ravindran, Shuhua Peng and Shuying Wu*

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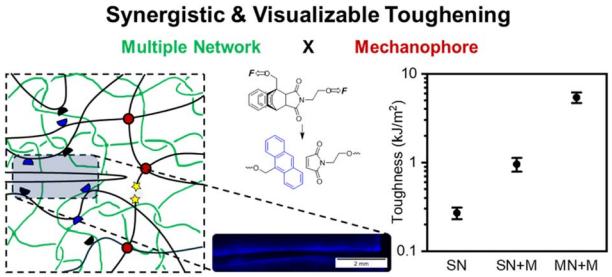
Synergistic and visualized toughening of elastomers through mechanophore crosslinks and multiple networks

Zeyu Wang, Yongming Wang, Ming-Chi Wang, Zehao Fan and Junpeng Wang*



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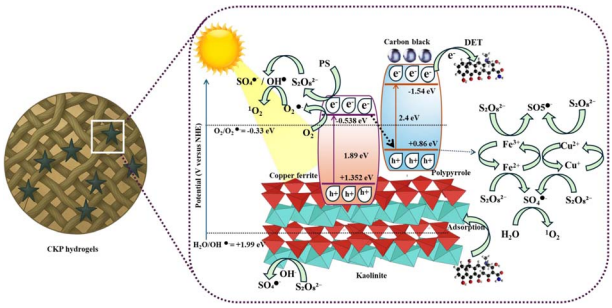
Engineered 3D copper ferrite/kaolinite/polypyrrole carbon black hydrogels for efficient persulfate activation in tetracycline degradation: kinetics, mechanistic insights, toxicity, and green metrics

Akash Balakrishnan,* Tushar Kumar Khora, Khwairakpam Bidya Devi, Mahendra Chinthala, Arvind Kumar and Natarajan Rajamohan*



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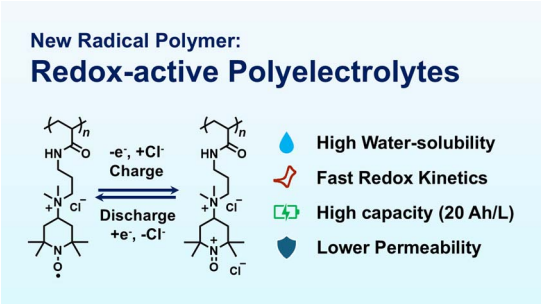
Combining low viscosity and high volumetric redox density of organic polymers for energy-efficient catholytes in redox flow batteries: a redox-active polyelectrolyte approach

Kohei Ishigami and Kenichi Oyaizu*



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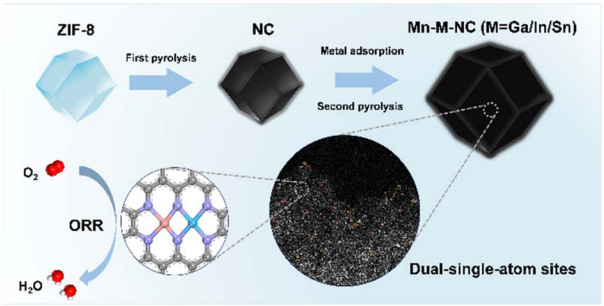
Synthesis of MnM–NC (M = Ga, In, Sn) dual-single-atom catalysts for efficient electrocatalytic oxygen reduction

Yujie Cui, Yihong Liu, Jiayi Li, Haibin Ma, Tingting Pan, Hainan Wei, Xinyue Shi, Xiaoyan Zhou, Ping Zhang, Weixing Niu, Shengnan Sun, Menghao Yang, Wei-Hsiang Huang,* Jiwei Ma and Hongfei Cheng*



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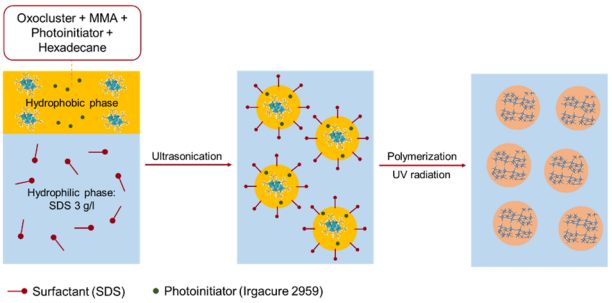

Confined-space synthesis of Zr-, Ti-, and Ti–Zr-oxocluster-based hybrid nanoparticles as catalysts for H_2O_2-mediated oxidations

Davide Vendrame, Giulia Bragaggia, Alessandro Dolmella, Giacomo Saielli, Mauro Carraro* and Silvia Gross*

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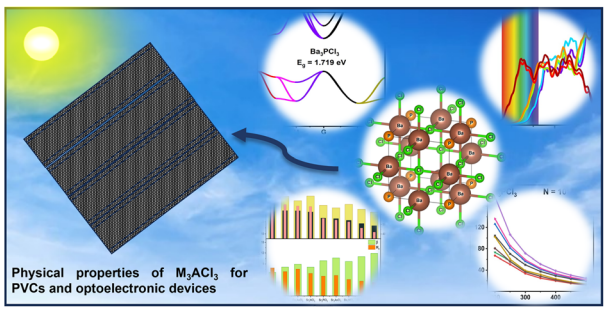
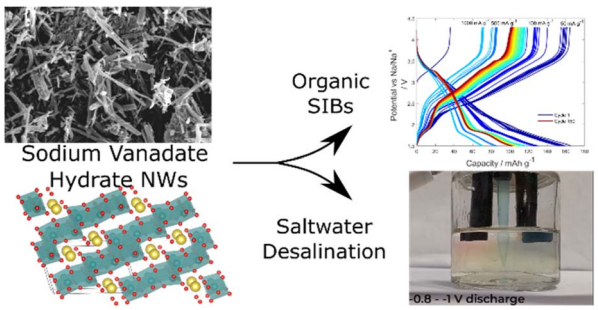


Inorganic M_3ACl_3 (M = Ca, Sr, Ba, A = N, P, As) perovskite-derivatives for next-generation solar cells and optoelectronics: in-depth analysis of stability, optoelectronic features, and temperature-dependent carrier mobilities

Zia Ur Rehman* and Zijing Lin*

34493



Nanostructured sodium vanadate hydrate as a versatile sodium ion cathode material for use in organic media and for aqueous desalination

Daniel Commandeur,* Vlad Stolojan, Monica Felipe-Sotelo, James Wright, David Watson and Robert C. T. Slade

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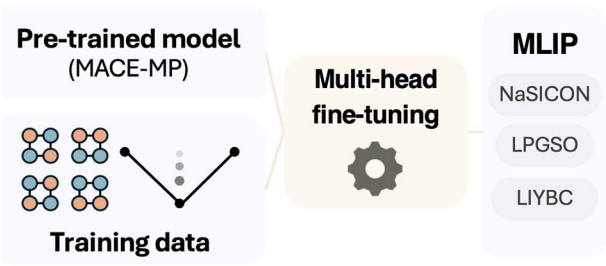

Accelerating the discovery of disordered multi-component solid-state electrolytes using machine learning interatomic potentials

Yanhao Deng, Yan Li, Gopalakrishnan Sai Gautam, Bonan Zhu* and Zeyu Deng*

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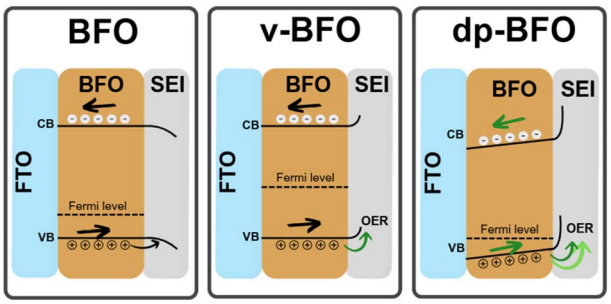

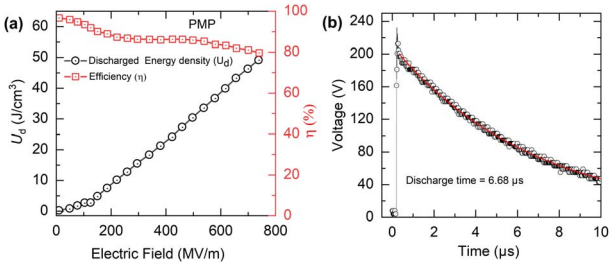

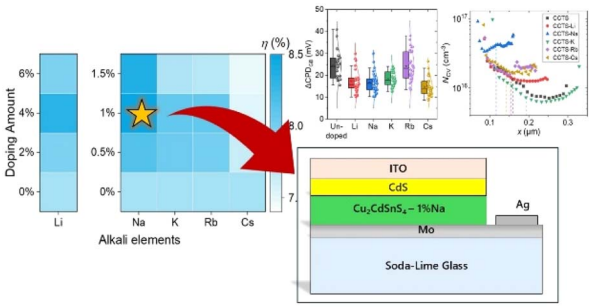

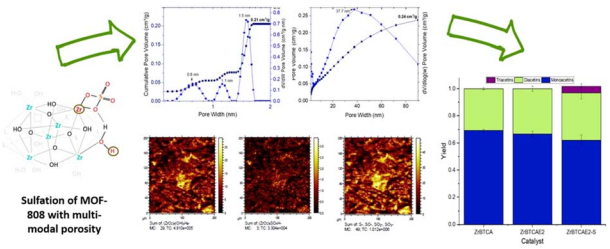

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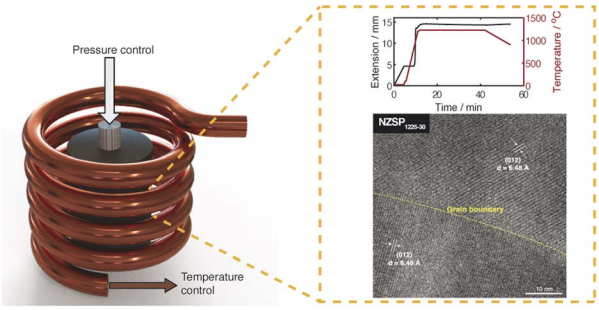

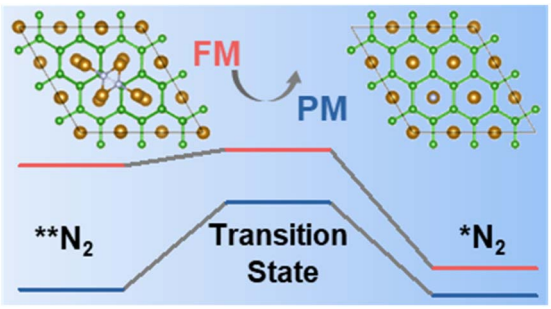

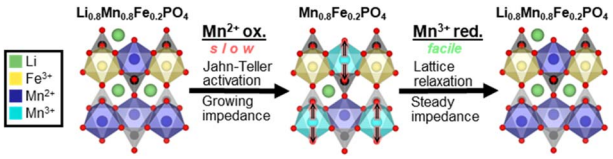

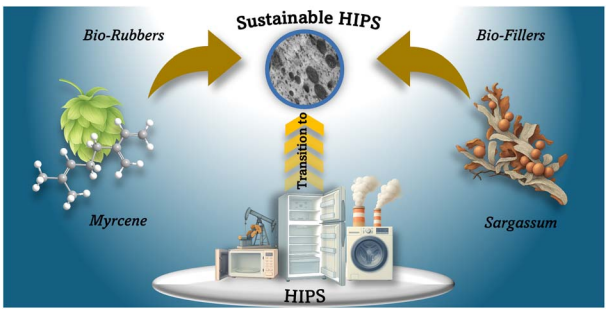

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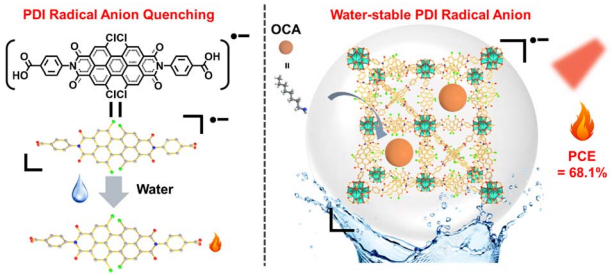
Water-stable perylene diimide radical anions in a metal–organic framework for efficient solar-thermal conversion and steam generation

Junxiao Wang, Klaus Müllen, Jun Guan* and Meizhen Yin*



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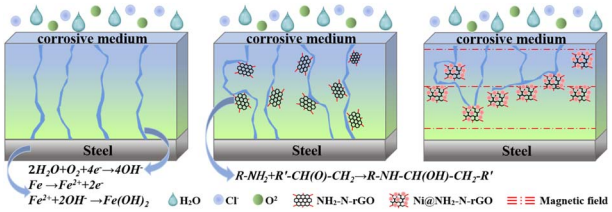
Corrosion resistance of hydrangea-like nano-Ni/amino N-doped rGO epoxy composite coatings constructed *via* magnetic field-oriented alignment

Peng Wang, Jian Wei,* Yanbin Zhang, Enhao Lv, Yi Yao, Jing Liu, Bowen Xin and Xueting Li



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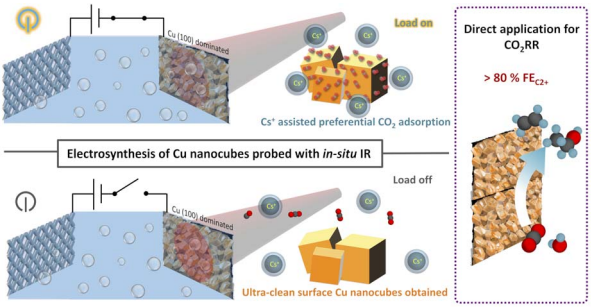
Cation- and CO_2-assisted electrochemical synthesis of clean, shape-controlled Cu nanocrystals for selective CO_2 reduction to C_2^+ products

Wei-Ting Tu, Tsung-Han Tsai, Ding-Huei Tsai, Yi-Ting Xie, Hsuan-Yu Liu, Ming-Kang Tsai,* Tsu-Chin Chou* and Yung-Tin (Frank) Pan*



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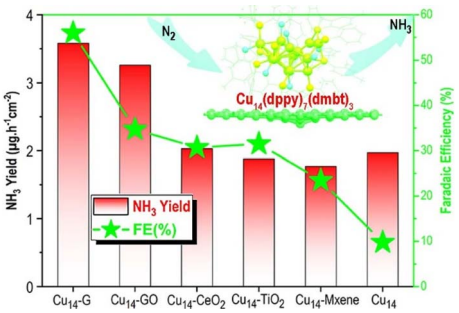
A $Cu_{14}(dppy)_7(dmbt)_3$ cluster of chelating structure for enhanced electrocatalytic nitrogen reduction to ammonia

Aamir Shehzad, Ran Cheng, Fang Zhang and Zhixun Luo*



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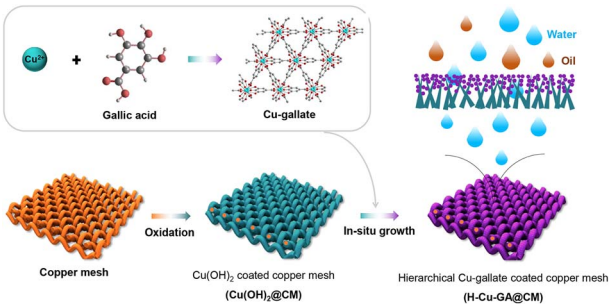
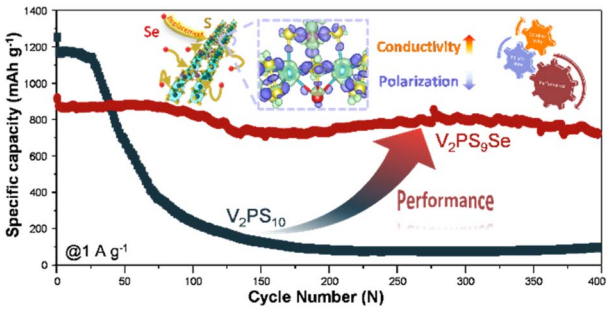


A hierarchical Cu-gallate-based mesh membrane for oil/water separation

Yinlu Fan, Yuxin Li, Jiu Shi and Yanwei Sun*

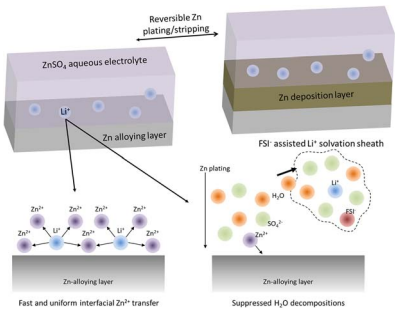
34851



A novel 1D van der Waals $V_2PS_xSe_{10-x}$ ($x = 7$–10) anode for enhanced electrochemical kinetics and high-rate performance *via* Se alloying in lithium-ion batteries

Xiaojie Zhang, Xue Dong, Chaeheon Woo, Yeongjin Kim, Jinsu Kang, Kyung In Kim, Yeong Hyeop Kim, Donghyeon Lee, Minjae Kim, Junyoung Mun,* Hak Ki Yu* and Jae-Young Choi*

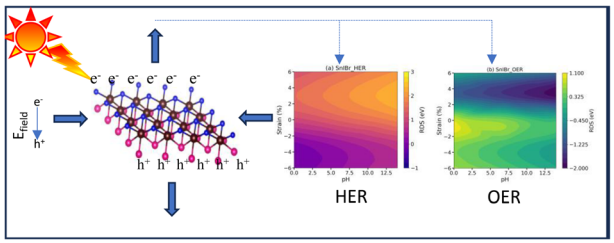
34861



Lithium ion mediated interfacial transfer and solvation structure enable stable zinc-alloying interface for aqueous zinc battery

Xin Zhou, Zheng Qian, Zhendong Li, Deyu Wang, Zhenlian Chen,* Xiayin Yao* and Zhe Peng*

34873



Design of novel SnIX (X = Br/Cl) Janus layers: electronic, optical, and photocatalytic properties, as well as defect and strain engineering

Anjana E. Sudheer, Golla Tejaswini, Matthias Posselt and D. Murali*

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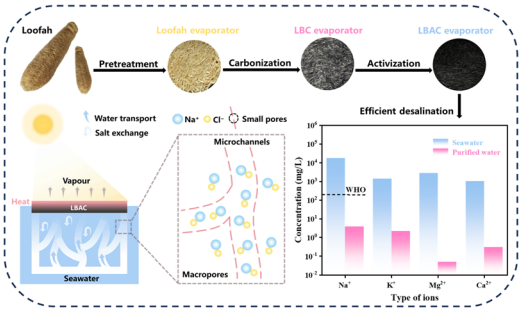

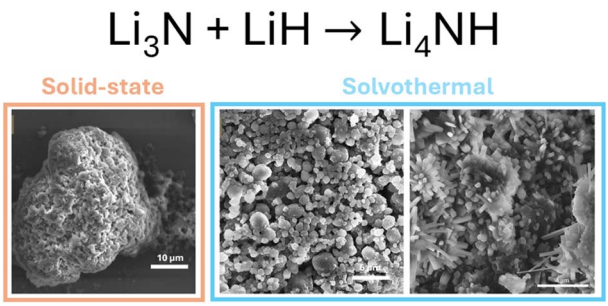

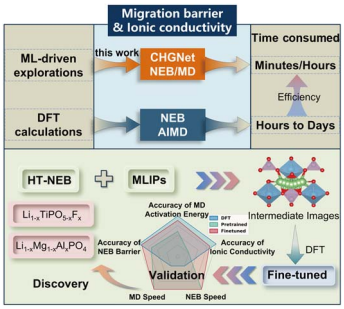

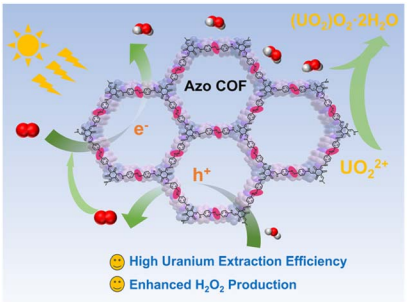

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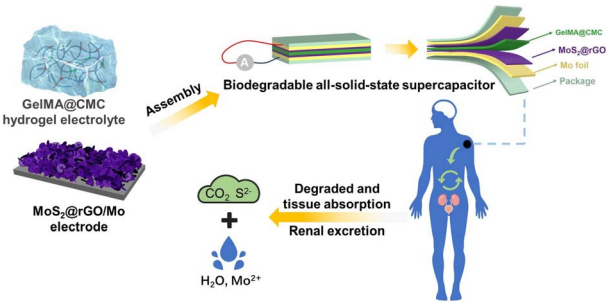
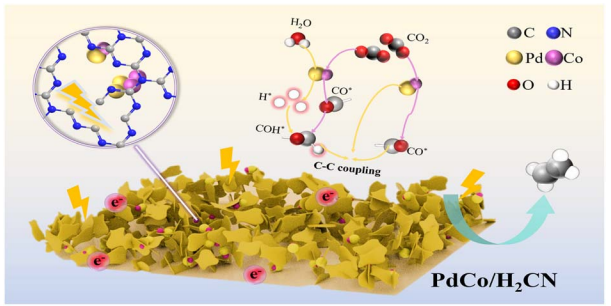


A biodegradable and flexible solid-state supercapacitor based on a natural polymer dual network hydrogel electrolyte

Xu Zeng, Yankun Guo, Xin Wei, Peiyu Cui, Junlong Yao, Yani Guo* and Yimin Sun*

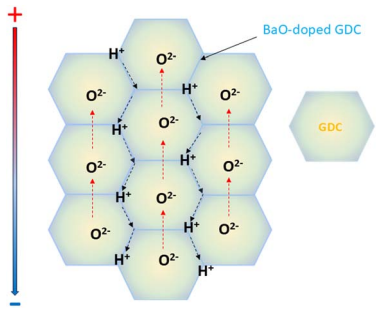
34948



Nitrogen vacancies rich C_3N_4 supported PdCo catalyst for selective photocatalytic CO_2 reduction to C_2H_4

Chao Huang, Xuelian Yu,* Guocheng Lv, Yingmo Hu and Libing Liao

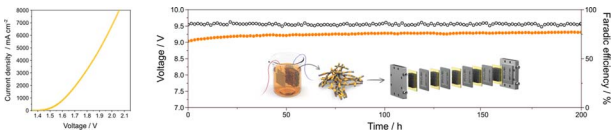
34955



Super-high dual-ion conductivity of BaO-doped GDC electrolytes for solid oxide fuel cells

Xiangcheng Liu, Qiuning Li, Lingping Zeng, Tengpeng Wang, Dehua Dong* and Huanting Wang*

34962



Unified anodes with different nickel–iron-based phases for durable AEM electrolyzers achieving high performance of 8000 mA cm^{-2} at 2.05 V

SungBin Park, Hosung Choi, Geumbi Na, Hee Ji Choi, Dae Hyun Lee, Min Seok Gi, Ji Eun Park,* Yong-Hun Cho* and Yung-Eun Sung*