Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

Journal of Materials Chemistry A

Materials for energy and sustainability

rsc.li/materials-a

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 12(6) 3163–3754 (2024)

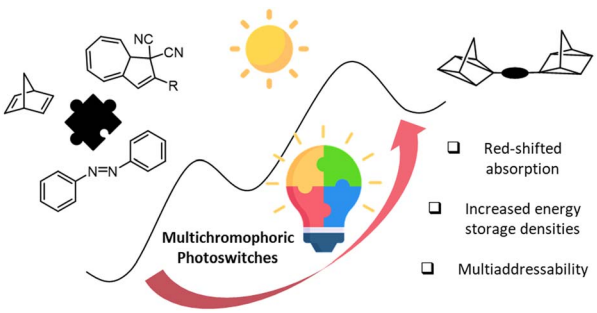
Cover
See Xiao Li, Tao Hu *et al.*, pp. 3283–3293. Image reproduced by permission of Xiao Li from *J. Mater. Chem. A*, 2024, **12**, 3283.

REVIEWS

3180

Multichromophoric photoswitches for solar energy storage: from azobenzene to norbornadiene, and MOST things in between

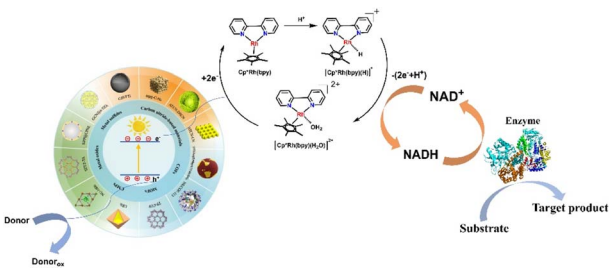
Rebecca J. Salthouse and Kasper Moth-Poulsen*



3209

Recent advances in porous materials for photocatalytic NADH regeneration

Gaozhen Zhao, Chonghui Yang, Wu Meng* and Xiaowen Huang*



ROYAL SOCIETY OF CHEMISTRY

View Article Online

EES Catalysis

GOLD OPEN ACCESS

Exceptional research on energy and environmental catalysis

Open to everyone. Impactful for all

rsc.li/EESCatalysis

Fundamental questions
Elemental answers

Registered charity number: 207890

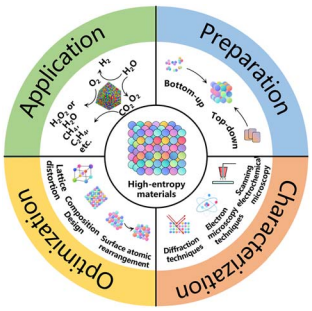
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

REVIEWS

3230

Progresses on high-entropy nano-catalysts for electrochemical energy conversion reactions

Lihua Zhang, Tong Wu, Yinbo Zhan, Yilin Dong, Fei Wei, Dongliang Zhang, Bowei Zhou, Zheng Tan, Changying Zhao and Xia Long*

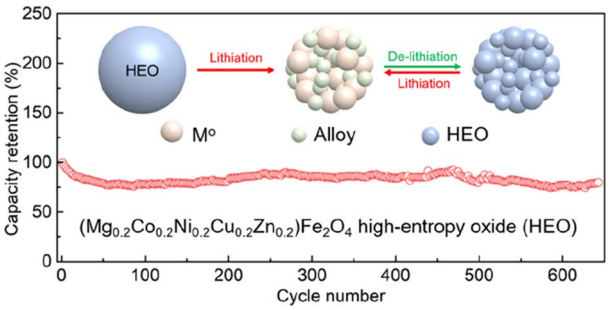


COMMUNICATIONS

3251

Synthesis of spinel $(Mg_{0.2}Co_{0.2}Ni_{0.2}Cu_{0.2}Zn_{0.2})Fe_2O_4$ in seconds for lithium-ion battery anodes

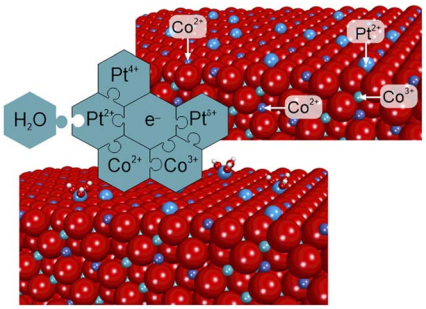
Ruiqi Ren, Dixian Wu, Jingyuan Zhang, Xiangyu You, Zikang Xu, Jinyao Yang, Hang Ren, Guoyin Zhu, Yizhou Zhang and Shengyang Dong*



3258

Atomistic picture of electronic metal support interaction and the role of water

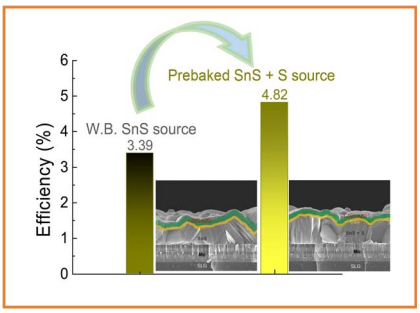
Lukáš Fusek, Matteo Farnesi Camellone, Michal Ronovský, Maximilian Kastenmeier, Tomáš Skála, Pankaj Kumar Samal, Nataliya Tsud, Sascha Mehl, Jan Škvára, Tomáš Dolák, Vitalii Uvarov, Martin Setvín, Viktor Johánek, Stefano Fabris, Olaf Brummel, Jörg Libuda, Josef Mysliveček,* Simone Piccinin* and Yaroslava Lykhach*



3265

Prebaking of an SnS source with sulfur for achieving higher photovoltaic performance in VTD-SnS thin films for solar cells

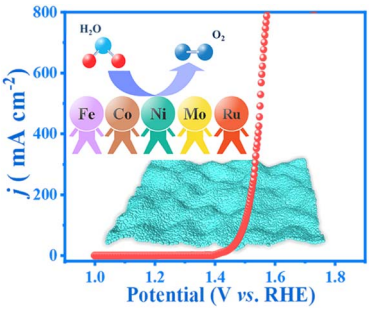
Rahul Kumar Yadav, Pravin S. Pawar, Yong Tae Kim, Indu Sharma and Jaeyeong Heo*



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

COMMUNICATIONS

3276

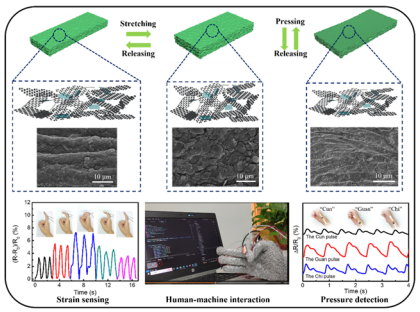


Rapid, self-sacrificing template synthesis of two dimensional high-entropy oxides toward high-performance oxygen evolution

Xiaofeng Tian, Hongdong Li,* Rui Chang, Yu Yang, Zhenhui Wang, Tian Dong, Jianping Lai, Shouhua Feng and Lei Wang*

PAPERS

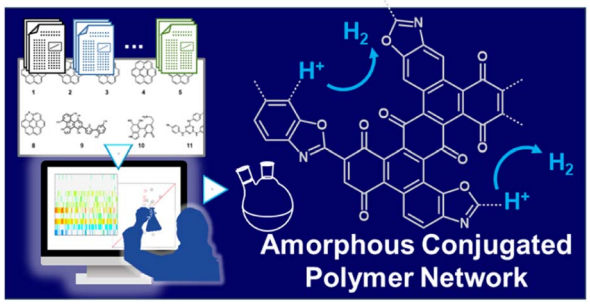
3283



A biodegradable, highly sensitive and multifunctional mechanical sensor based on rGO-silk fibroin hydrogel for human motion detection and gesture recognition

Ke Chen, Baoyang Liu, Ning Hu, Qiaolin Fan, Fawang Zhan, Zhou Zhang, Zhonghua Ni, Xiao Li* and Tao Hu*

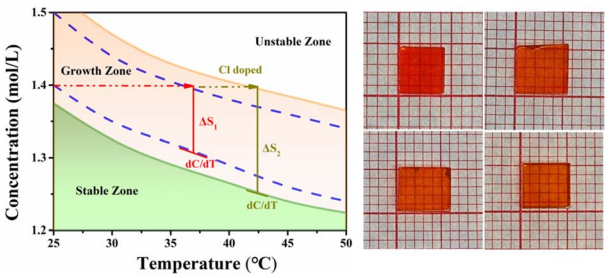
3294



Efficient design and synthesis of an amorphous conjugated polymer network for a metal-free electrocatalyst of hydrogen evolution reaction

Wakana Hamada, Mafumi Hishida, Ryuto Sugiura, Haruka Tobita, Hiroaki Imai, Yasuhiko Igarashi and Yuya Oaki*

3304



Single nucleation of Cl-doped $FAPbBr_3$ with inhibited ion migration for ambipolar radiation detection

Quanchao Zhang, Xin Liu,* Xin Zhang, Zijian Wang, Baoqiang Zhang, Yingying Hao, Alain Dubois, Wanqi Jie and Yadong Xu*

This journal is © The Royal Society of Chemistry 2024

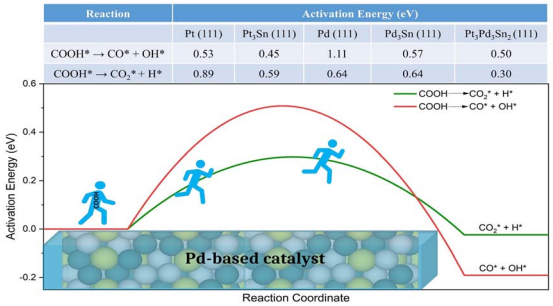
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

3311

The origins of formic acid electrooxidation on selected surfaces of Pt, Pd, and their alloys with Sn

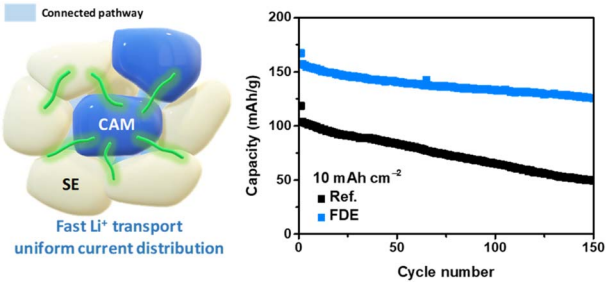
Radhey ShyamYadav, Medhanie Gebremedhin Gebru, Hanan Teller, Alex Schechter and Haya Kornweitz*



3323

Boosting the electrochemical performance with functionalized dry electrodes for practical all-solid-state batteries

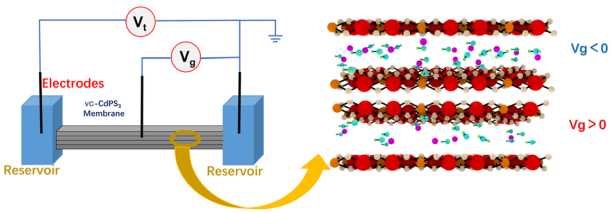
Dongsoo Lee and Arumugam Manthiram*



3331

Nanofluidic ion regulation membranes based on two-dimensional vacancy-containing $CdPS_3$ membrane

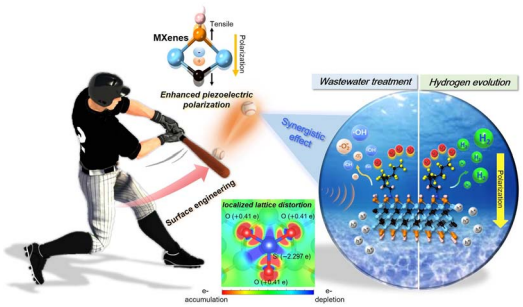
Meng Zhang, Chenhui Huang, Zhaofeng Zhai, Xiaomin Kang, Jiang Ju* and Xitang Qian*



3340

An ultraefficient surface functionalized $Ti_3C_2T_x$ MXene piezocatalyst: synchronous hydrogen evolution and wastewater treatment

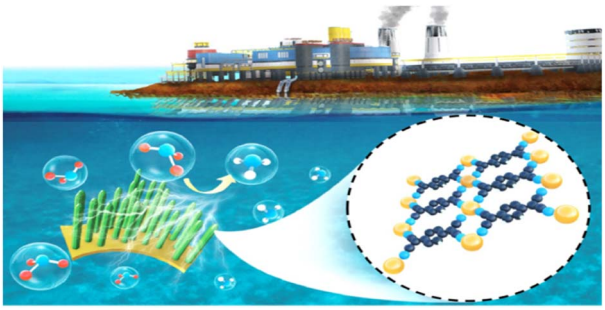
Sz-Nian Lai, Winston Yenyu Chen, Chao-Chun Yen, Yin-Song Liao, Po-Han Chen, Lia Stanciu and Jyh Ming Wu*



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

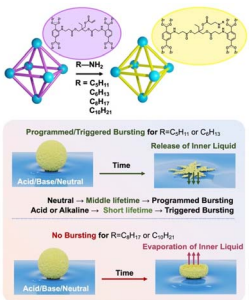
3352



$Fe(TCNQ)_2$ nanorod arrays: an efficient electrocatalyst for electrochemical ammonia synthesis *via* the nitrate reduction reaction

Nilmadhab Mukherjee, Ashadul Adalder, Narad Barman, Ranjit Thapa, Rajashri Urkude, Biplab Ghosh and Uttam Kumar Ghorai*

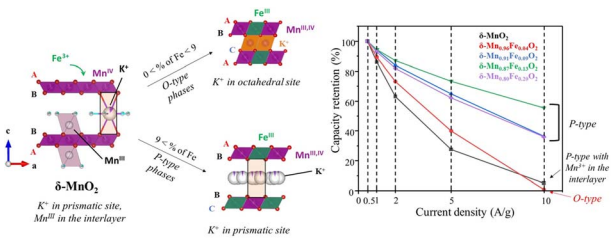
3362



pH-triggered adjustable bursting of liquid marbles in water pools

Saurav Kumar, Nishanta Barman, Angana Borbora, Priyam Mondal, Mizuki Tenjimbayashi* and Uttam Manna*

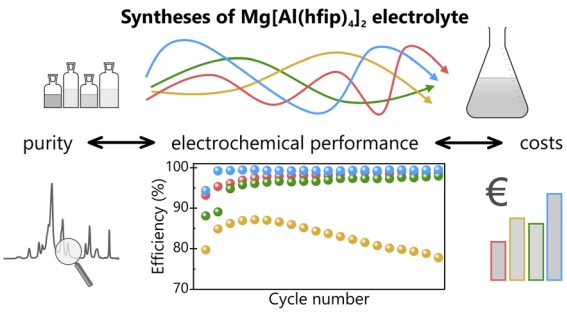
3373



Incorporation of Fe^{3+} into MnO_2 birnessite for enhanced energy storage: impact on the structure and the charge storage mechanisms

Ronan Invernizzi, Vadim M. Kovrugin, Louise Molinié, Antonella Iadecola, Mathieu Duttine, Lydie Bourgeois, Jacob Olchowka* and Liliane Guerlou-Demourgues*

3386



Evaluating the synthesis of $Mg[Al(hfip)_4]_2$ electrolyte for Mg rechargeable batteries: purity, electrochemical performance and costs

Tjaša Pavčnik, Jernej Imperl, Mitja Kolar, Robert Dominko and Jan Bitenc*

This journal is © The Royal Society of Chemistry 2024

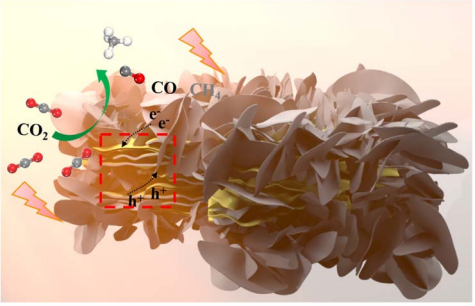
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

3398

Synergistic mediation of dual donor levels in CNS/BOCB-OV heterojunctions for enhanced photocatalytic CO_2 reduction

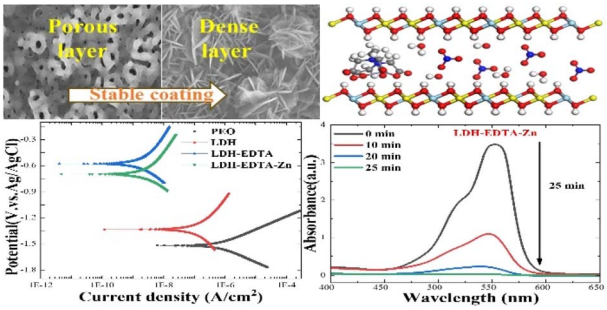
Ruiming Fang, Zhongqing Yang,* Jiajun Sun, Chenxuan Zhu, Yanglin Chen, Ziqi Wang and Can Xue*



3411

Modulating chelation with pH sensitivity for controlled structural defects and enhanced electrochemical and photocatalytic activities of LDH films

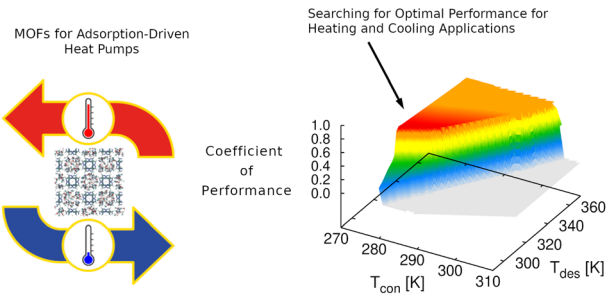
Muhammad Ali Khan, Ananda Repycha Safira and Mosab Kaseem*



3434

Alcohol-based adsorption heat pumps using hydrophobic metal–organic frameworks

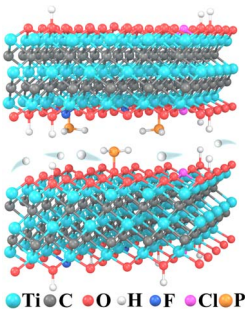
R. M. Madero-Castro, A. Luna-Triguero, C. González-Galán, José Manuel Vicent-Luna* and Sofía Calero*



3449

Selective grafting of phosphorus onto $Ti_3C_2T_x$ MXene enables a two-proton process and enhanced charge storage

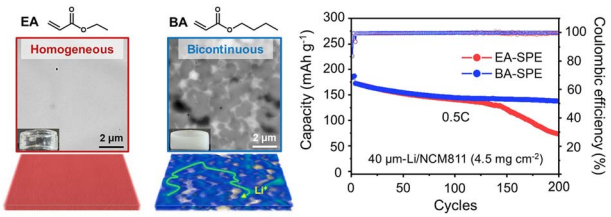
Hao Li, Ke Fan, Pei Xiong, Hanmo Zhou, Zezhou Lin, Keyu Tao, Tiancheng Liu, Xuyun Guo, Ye Zhu, Lyuchao Zhuang, Wei Han, Chen Yang, Yan Liu, Molly Meng-Jung Li,* Mingwang Fu, John Wang and Haitao Huang*



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

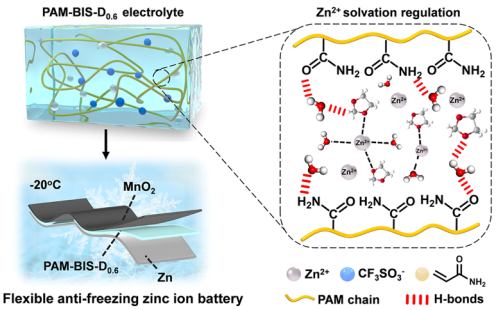
3460



Tuning phase structures of *in situ* polymerized elastomeric electrolytes *via* monomer structure engineering for achieving high stability in solid-state lithium metal batteries

Seung Ho Kwon, Michael J. Lee, Junghun Han, Ju Hong Min, Seongmin Kim, Se Young Kim, Jinseok Park, Eunji Lee,* Seung Woo Lee* and Bumjoon J. Kim*

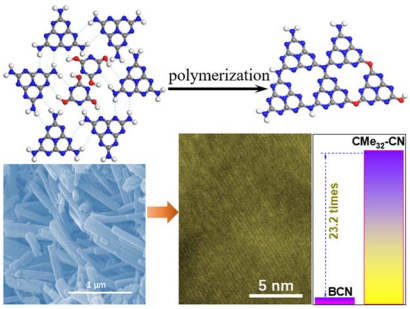
3470



Organohydrogel electrolytes with solvated structure regulation for highly reversible low-temperature zinc metal batteries

Feng Zhang, Mingchen Yang, Pengda Fang, Jiangtao Yu, Xinyu Ma, Yin Hu* and Feng Yan*

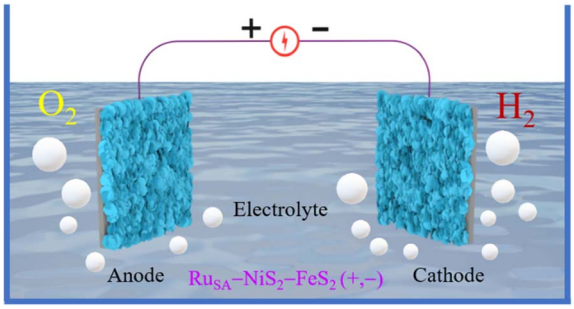
3480



Crystalline oxygen-bridged carbon nitride from self-assembled supramolecular intermediate for efficient photocatalytic H_2 evolution

Guangzheng Huang, Bowen Xiao, Liyan Bao, Dengke Wang, Yannan Luo, Shicheng Yan* and Honglin Gao*

3489



Ruthenium single atoms implanted on NiS_2-FeS_2 nanosheet heterostructures for efficacious water electrolysis

Ram Babu Ghising, Uday Narayan Pan, Mani Ram Kandel, Purna Prasad Dhakal, Saleem Sidra, Do Hwan Kim, Nam Hoon Kim* and Joong Hee Lee*

This journal is © The Royal Society of Chemistry 2024

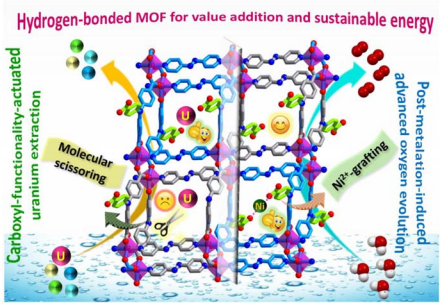
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

3501

Pendent carboxylic acid-fuelled high-performance uranium extraction in a hydrogen-bonded framework and prolifically improved water oxidation *via* post-metalation-actuated composite fabrication

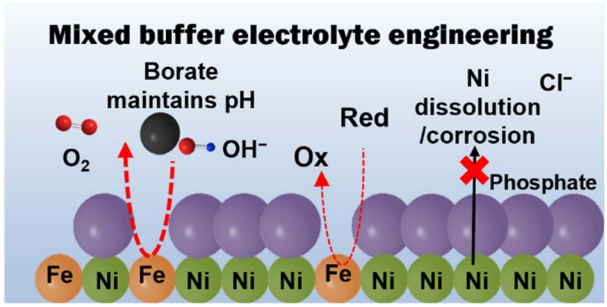
Nilanjan Seal,* Arun Karmakar, Subrata Kundu* and Subhadip Neogi*



3513

Dynamic stabilization of nickel-based oxygen evolution electrocatalysts in the presence of chloride ions using a phosphate additive

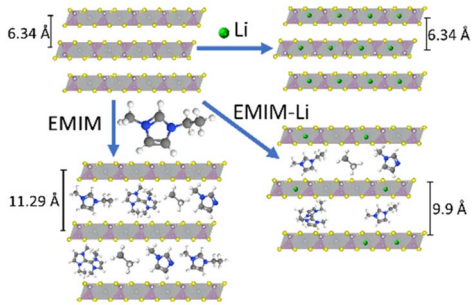
Hiroki Komiya, Keisuke Obata, Tetsuo Honma and Kazuhiro Takanabe*



3523

Charge compensation in a layered van der Waals $NiPS_3$ host through various cationic intercalations

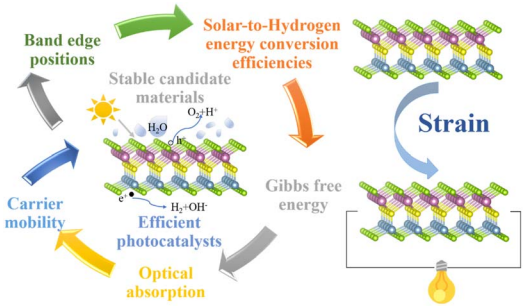
Sebastian Pazek, Anna Efimenko, Roberto Félix, Maria Roslova, Christine Joy Querebillo, Mikhail V. Gorbunov, Alexander Ovchinnikov, Andreas Koitzsch, Carlos Escudero, Yuliia Shemerliuk, Saicharan Aswartham, Bernd Büchner, Ahmad Omar* and Daria Mikhailova*



3542

Two-dimensional Janus chalcogenides: candidates for efficient photocatalysts and piezoelectric materials

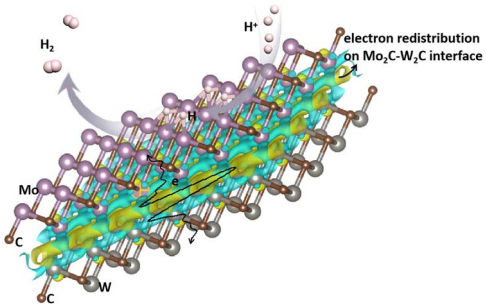
Chenchen Qi, Cuixia Yan,* Qiuyang Li, Ting Yang, Shi Qiu and Jinming Cai*



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

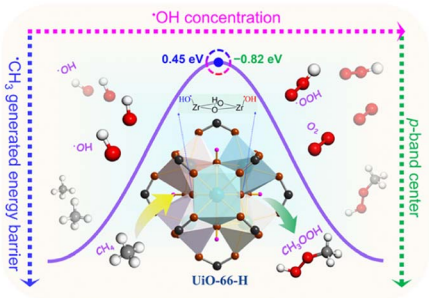
3557



Boosting electrocatalytic hydrogen evolution over a Mo_2C–W_2C heterostructure by interface-induced electron modulation

Lijuan Jiang, Ruijing Wang, Huimin Zhou, Guang-Feng Wei* and Xuefeng Wang*

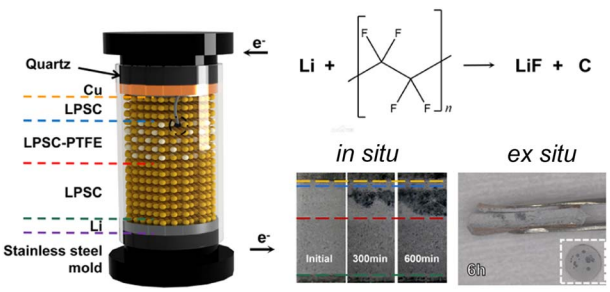
3565



Deciphering structural evolution of adsorbed ˙OH species on Zr-oxo nodes of UiO-66 to modulate methane hydroxylation

Ling-Chan Tian, Geqian Fang, Yun Zhou, Wenjun Yu, Lin Li, Jin-Nian Hu, Haiyan Wang, Jin-Xia Liang,* Chun Zhu,* Xiaodong Wang and Jian Lin*

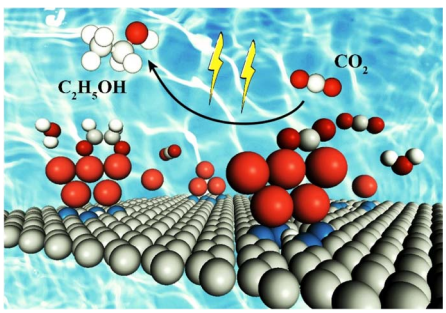
3575



Dendrite growth and inhibition in all-solid-state lithium metal batteries: *in situ* optical observation

Haowen Liu, Weining Jiang, Wenjie Chen, Qiyuan Lin, Shuaiyang Ren, Yipeng Su, Ruoyu Tong and Yuegang Zhang*

3580



The activity origin of C-N-Cu electrocatalysts for ethanol formation in the CO_2 reduction reaction under working conditions

Xiaotao Zhang, Jiao Chen, Guoying Gao,* Hongyan Wang, Yongliang Tang, Bai Sun,* Yuxiang Ni, Yuanzheng Chen* and Yuan Ping Feng

This journal is © The Royal Society of Chemistry 2024

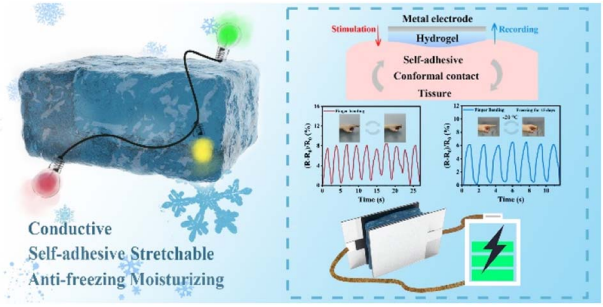
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

3589

Multifunctional conductive hydrogels for wearable sensors and supercapacitors

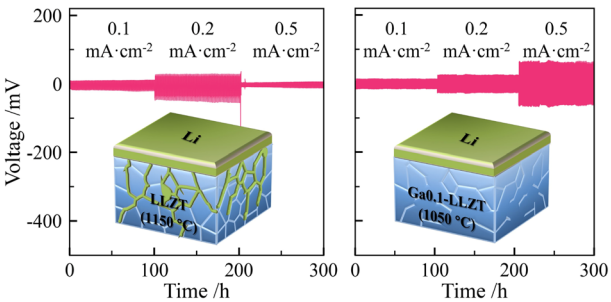
Quancai Li, Bin Tian,* Guilin Tang, Haoye Zhan, Jing Liang,* Panwang Guo, Qun Liu and Wei Wu*



3601

Improvement of the Li-ion conductivity and air stability of the Ta-doped $Li_7La_3Zr_2O_{12}$ electrolyte *via* Ga co-doping and its application in Li–S batteries

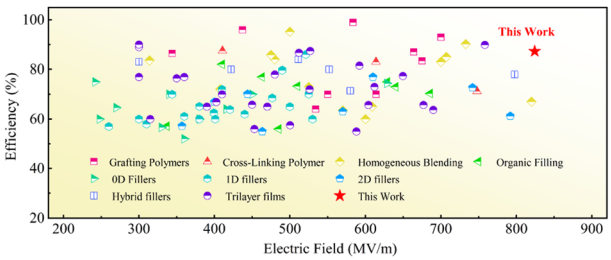
Kai Ma, Bowen Chen, Cheng-Xin Li* and Venkataraman Thangadurai*



3616

Optimizing the gradient of electric field distribution and inhibiting charge injection in multilayer dielectric films for high capacitive performance

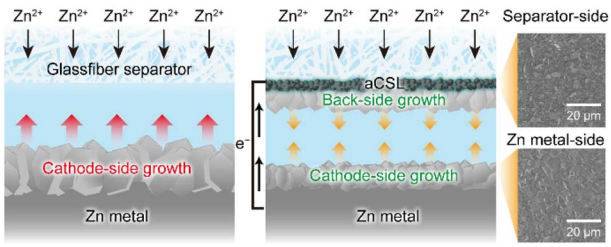
Zhicheng Li, Yu Zhang, Zhongbin Pan,* Xu Fan, Peng Li, Haiming Huang,* Weiliang Wang, Weidong Chen, Jinjun Liu and Weiping Li*



3623

A hydrophilic Janus-faced separator with functionalized nanocarbon for stable cycling of aqueous Zn-metal batteries

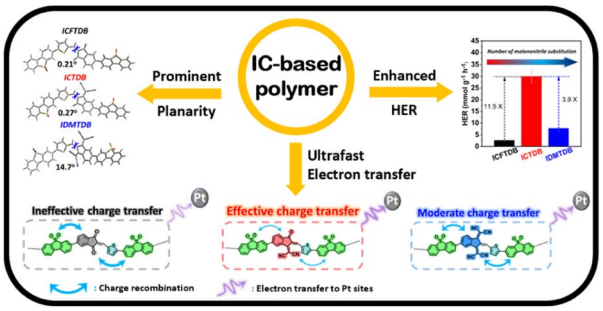
Hyuntae Lee, Jiwoong Kang, Ho Won Kang, Mingyu Lee, Jaewoong Han, Minhong Lim, Jaeho Lee, Woosuck Kwon, Dae-Hyun Nam, Byung Gon Kim* and Hongkyung Lee*



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

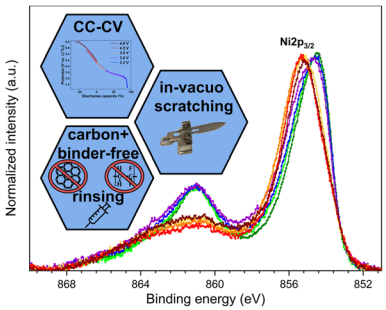
3633



Indanone-based conjugated polymers enabling ultrafast electron transfer for visible light-driven hydrogen evolution from water

Tse-Fu Huang, Ying-Rang Zhuang, Chih-Li Chang, Ching-Li Huang, Wei-Cheng Lin, Zi-Cheng Jiang, Li-Yu Ting, Islam M. A. Mekhemer, Yu-En Sun, Pinit Kidkhunthod, Jeng-Lung Chen, Yi-Chan Huang, Hung-Kai Hsu, Yuan-Ting Tseng, Yi-Hsiang Wu, Bing-Heng Li, Shang-Da Yang, Yen-Ju Cheng and Ho-Hsiu Chou*

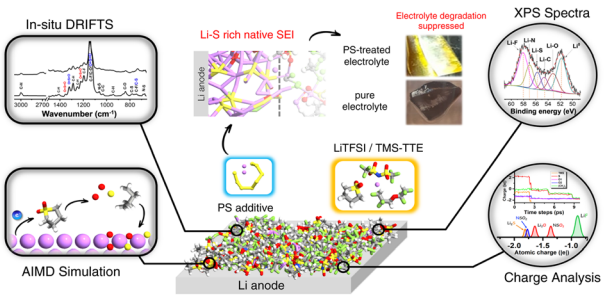
3644



Voltage-dependent charge compensation mechanism and cathode electrolyte interface stability of the lithium-ion battery cathode materials $LiCoO_2$ and $LiNi_{1/3}Mn_{1/3}Co_{1/3}O_2$ studied by photoelectron spectroscopy

Maximilian Mellin, Gennady Cherkashinin, Elham Mohseni, Robert Phillips, Wolfram Jaegermann* and Jan P. Hofmann*

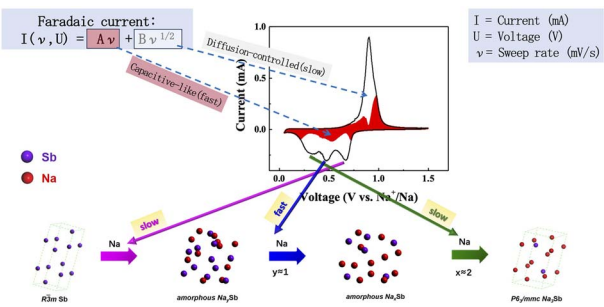
3659



Understanding the formation chemistry of native solid electrolyte interphase over lithium anode and its implications using a LiTFSI/TME-TTE electrolyte and polysulfide additive

Bikila Nagasa Olana, Shih-Huang Pan, Bing-Joe Hwang, Holger Althues, Jyh-Chiang Jiang and Shawn D. Lin*

3671



Understanding the fast kinetics and mechanism of sodium storage in antimony using *ab initio* grand canonical Monte Carlo simulation and *operando* X-ray scattering

Manni Li, Tian Qiu, Samuel S. Welborn, Alexandre C. Foucher, Jintao Fu, Benjamin K. Lesel, Zeyu Wang, Lin Wang, Eric A. Stach, Andrew M. Rappe* and Eric Detsi*

This journal is © The Royal Society of Chemistry 2024

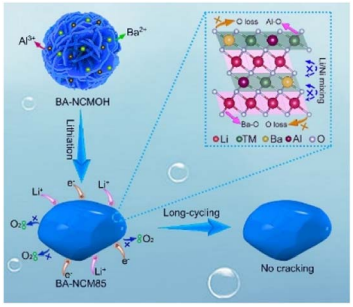
Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

3682

Enhanced Li-ion intercalation kinetics and lattice oxygen stability in single-crystalline Ni-rich Co-poor layered cathodes

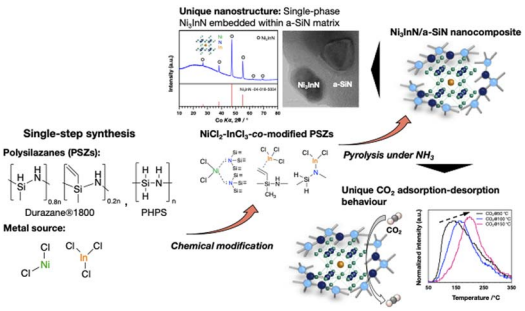
Hujun Zhang, Li Qin, Michal Sedlacik, Petr Saha, Qilin Cheng,* Haifeng Yu* and Hao Jiang



3689

An *in situ* growth route towards anti-perovskite Ni_3InN nanoparticles embedded within amorphous silicon nitride

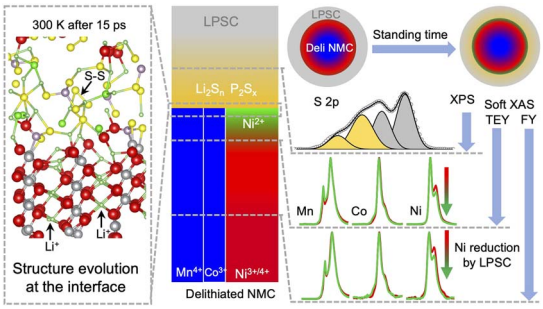
Shotaro Tada, Sakurako Takazawa, Norifumi Asakuma, Maxime Cheype, Sawao Honda, Ravi Kumar, Samuel Bernard and Yuji Iwamoto*



3700

Interfacial degradation of the NMC/Li_6PS_5Cl composite cathode in all-solid-state batteries

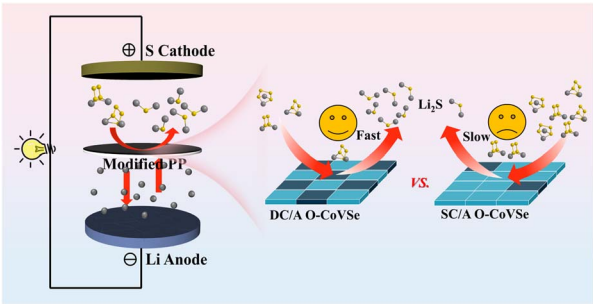
Xudong Hu, Zishuo Zhao, Yang Zhao, Xuelong Wang, Sami Sainio, Dennis Nordlund, Cristina M. Ruse, Xiao-Dong Zhou, Shannon W. Boettcher, Dong Hou,* Qi-Jun Hong* and Linqin Mu*



3711

Oxygen-incorporated crystalline/amorphous heterophase cobalt vanadium selenide nanoplates with dense interfacial sites for robust lithium–sulfur batteries

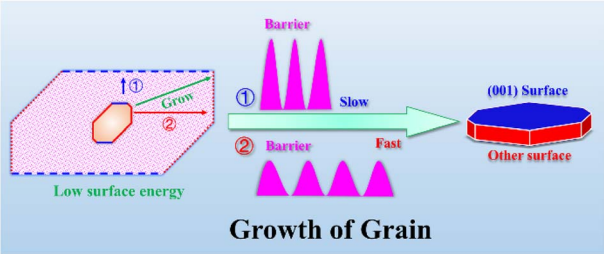
Pengcheng Tan, Yuan Yin, Daoping Cai,* Ban Fei, Chaoqi Zhang, Qidi Chen* and Hongbing Zhan



Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.

PAPERS

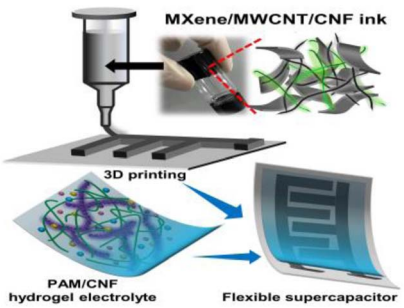
3722



The grain morphology and surface properties of a Li-rich Li_2MnO_3 cathode material: a first-principles study

Xiaotong Yan, Xingyu Zhou, Chunwei Zhu, Weijie Huang and Yu-Jun Zhao*

3734

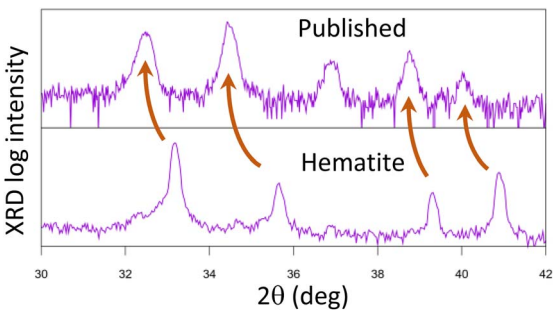


3D printed MXene-based films and cellulose nanofiber reinforced hydrogel electrolyte to enable high-performance flexible supercapacitors

Guoqiang Zhou, Xinyue Liu, Chaozheng Liu, Zhenglin Li, Chuhang Liu, Xiaojie Shi, Ziyan Li, Changtong Mei* and Mei-Chun Li*

COMMENTS

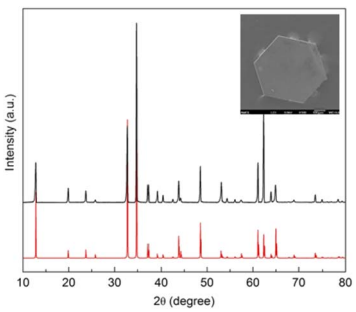
3745



Comment on "A $K_2Fe_4O_7$ superionic conductor for all-solid-state potassium metal batteries", by H. Yuan *et al.*, *J. Mater. Chem. A*, 2018, 6, 8413–8418

Doriano Brogioli, Michele Tribbia, Michael Gockeln, Jens Glenneberg, Julian Schwenzel and Fabio La Mantia

3748



Reply to the 'Comment on "A $K_2Fe_4O_7$ superionic conductor for all-solid-state potassium metal batteries"', by D. Brogioli, M. Tribbia, M. Gockeln, J. Glenneberg, J. Schwenzel and F. LaMantia, *J. Mater. Chem. A*, 2023, 11, https://doi.org/D3TA01240A

Hongming Yuan,* He Li, Tingsong Zhang and Guanghua Li

This journal is © The Royal Society of Chemistry 2024

CORRECTIONS

3750

Correction: The origins of formic acid electrooxidation on selected surfaces of Pt, Pd, and their alloys with Sn

Radhey Shyam Yadav, Medhanie Gebremedhin Gebru, Hanan Teller, Alex Schechter and Haya Kornweitz*

3751

Correction: Improving the performance of a SnS_2 cathode with interspace layer engineering using a Na^+ insertion/extraction method for aqueous zinc ion batteries

Ali Molaei Aghdam,* Nima Mikaeili Chahartagh, Shahriar Namvar, Mahshid Ershadi, Farshad Boorboor Ajdari* and Ehsan Delfani

Open Access Article. Published on 06 February 2024. Downloaded on 2/3/2026 7:08:29 AM.
This article is licensed under a Creative Commons Attribution 3.0 Unported Licence.