

Energy & Environmental Science

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ISSN 1754-5706 CODEN EESNBY 16(11) 4697-5536 (2023)



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See Shengli Zhang, Zhongfang Chen, Shiping Huang *et al.*, pp. 5003–5018. Image reproduced by permission of Xiangyu Guo from *Energy Environ. Sci.*, 2023, 16, 5003.



Inside cover

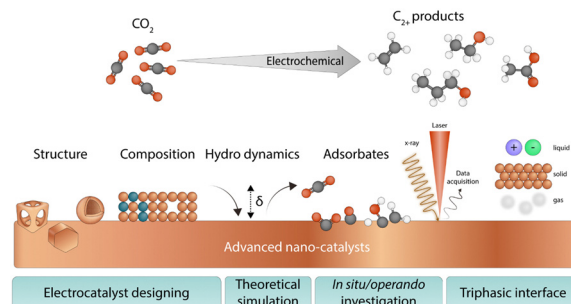
See Bin Chang, Huabin Zhang *et al.*, pp. 4714–4758. Image reproduced by permission of Huabin Zhang and Bin Chang from *Energy Environ. Sci.*, 2023, 16, 4714.

REVIEWS

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Electrochemical reduction of carbon dioxide to multicarbon (C_{2+}) products: challenges and perspectives

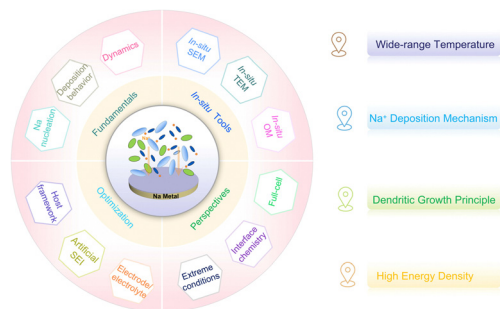
Bin Chang, Hong Pang, Fazal Raziq, Sibao Wang, Kuo-Wei Huang, Jinhua Ye* and Huabin Zhang*



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Wide-temperature-range sodium-metal batteries: from fundamentals and obstacles to optimization

Yu Sun, Jing-Chang Li, Haoshen Zhou and Shaohua Guo*



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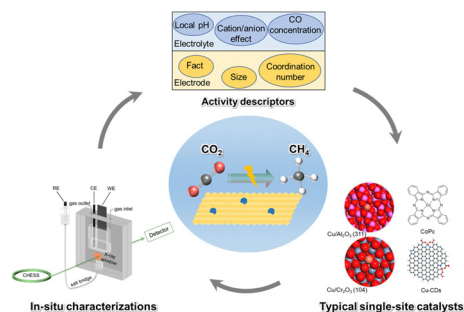


REVIEWS

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Advances and challenges in single-site catalysts towards electrochemical CO₂ methanation

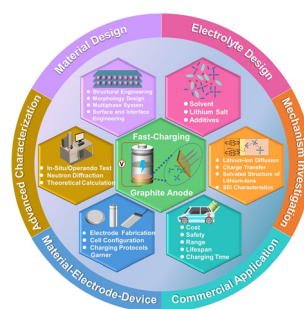
Jiexin Zhu, Lei Lv, Shahid Zaman, Xingbao Chen, Yuhang Dai, Shenghua Chen,* Guanjie He, Dingsheng Wang* and Liqiang Mai*



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Recent status, key strategies and challenging perspectives of fast-charging graphite anodes for lithium-ion batteries

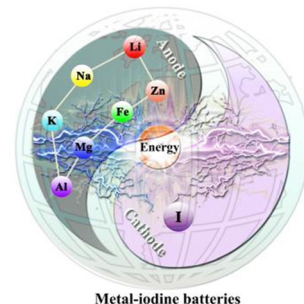
Yangyang Liu, Haodong Shi and Zhong-Shuai Wu*



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Metal-iodine batteries: achievements, challenges, and future

Leiqian Zhang, Hele Guo, Wei Zong, Yunpeng Huang, Jiajia Huang,* Guanjie He, Tianxi Liu, Johan Hofkens and Feili Lai*

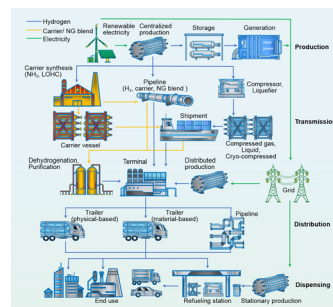


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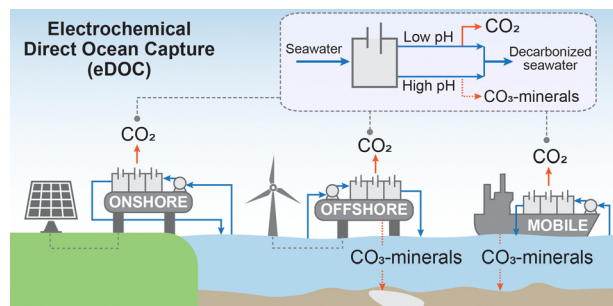
Hydrogen society: from present to future

Daqin Guan, Bowen Wang, Jiguang Zhang, Rui Shi, Kui Jiao,* Lincal Li, Yang Wang, Biao Xie, Qingwen Zhang, Jie Yu, Yunfeng Zhu, Zongping Shao* and Meng Ni*



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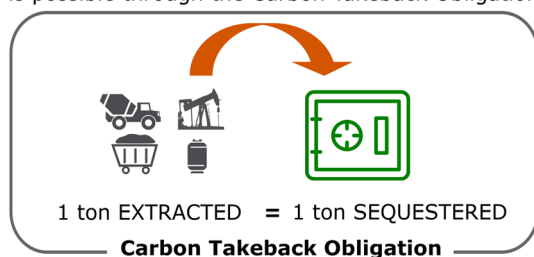


Direct ocean capture: the emergence of electrochemical processes for oceanic carbon removal

Prince Aleta, Abdelrahman Refaie, Mohsen Afshari, Ahmad Hassan and Mohammad Rahimi*

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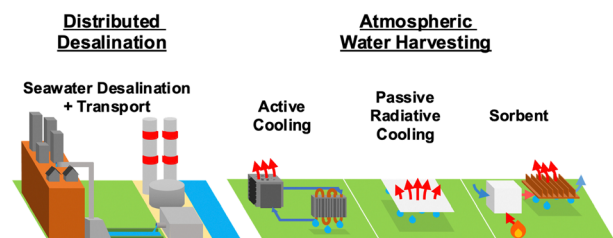
Carbon accounting without Life Cycle Analysis is possible through the Carbon Takeback Obligation



Carbon accounting without life cycle analysis

Klaus S Lackner,* Stephanie H Arcusa,* Habib Azarabadi, Vishrudh Sriramprasad and Robert Page

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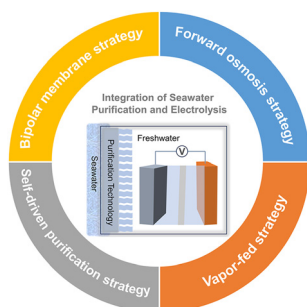


Addressing global water stress using desalination and atmospheric water harvesting: a thermodynamic and technoeconomic perspective

Jordan D. Kocher and Akanksha K. Menon*

MINIREVIEW

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Progress on smart integrated systems of seawater purification and electrolysis

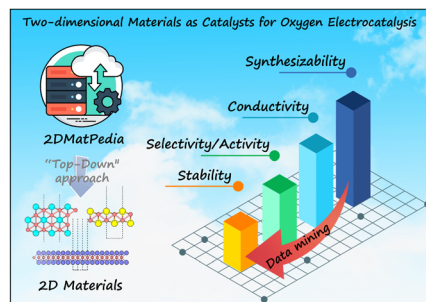
Lu Li, Gao Chen,* Zongping Shao and Haitao Huang*



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Data-driven pursuit of electrochemically stable 2D materials with basal plane activity toward oxygen electrocatalysis

Xiangyu Guo, Shengli Zhang,* Liangzhi Kou, Chi-Yung Yam, Thomas Frauenheim, Zhongfang Chen* and Shiping Huang*

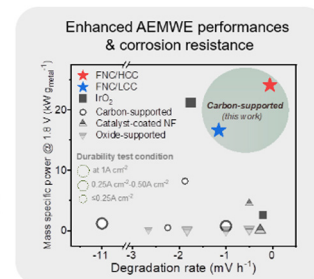
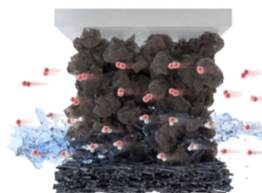


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Realizing the potential of hydrophobic crystalline carbon as a support for oxygen evolution electrocatalysts

Myeong-Geun Kim, Tae Kyung Lee, Eungjun Lee, Subin Park, Hyun Ju Lee, Haneul Jin, Dong Wook Lee, Min-Gi Jeong, Hun-Gi Jung, Kyungmin Im, Chuan Hu, Hyung Chul Ham, Kwang Ho Song, Yung-Eun Sung, Young Moo Lee and Sung Jong Yoo*

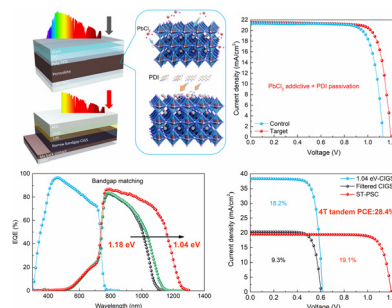
Hydrophobic & Crystalline carbon supports



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Over 28% efficiency perovskite/Cu(InGa)Se₂ tandem solar cells: highly efficient sub-cells and their bandgap matching

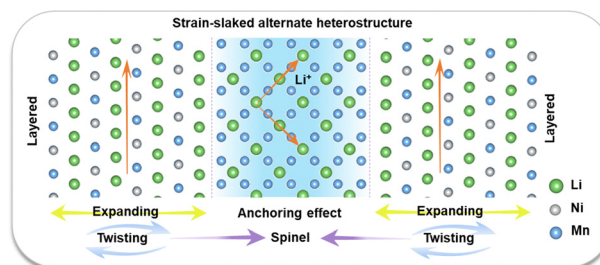
Xinxing Liu, Junjun Zhang, Liting Tang, Junbo Gong,* Wang Li, Zengyang Ma, Zexin Tu, Yanyan Li, Ruiming Li, Xuzhi Hu, Chen Shen, He Wang, Zhiping Wang, Qianqian Lin, Guojia Fang, Sheng Wang, Chang Liu, Zengming Zhang, Jianmin Li* and Xudong Xiao*



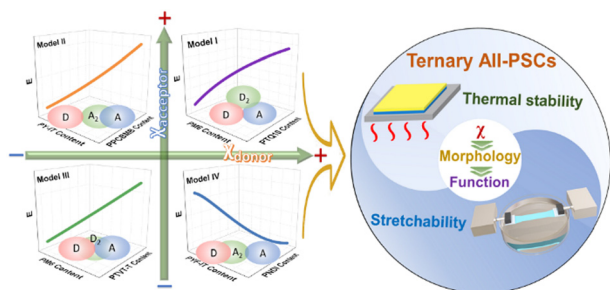
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Alternate heterogeneous superlattice control of lattice strain to stabilize Li-rich cathode

Ying Zhang, Xiaoyu Shi, Shuanghao Zheng, Yuguo Ouyang, Mingrun Li, Caixia Meng, Yan Yu* and Zhong-Shuai Wu*



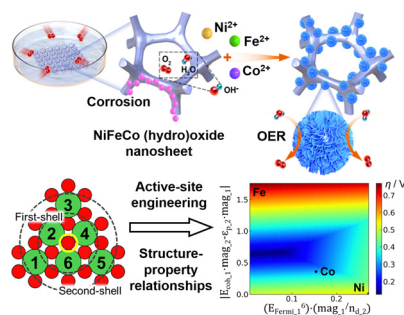
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Correlating miscibility, mechanical parameters, and stability of ternary polymer blends for high-performance solar cells

Kangkang Zhou, Kaihu Xian, Ruijie Ma, Junwei Liu, Mengyuan Gao, Saimeng Li, Tao Liu, Yu Chen, Yanhou Geng and Long Ye*

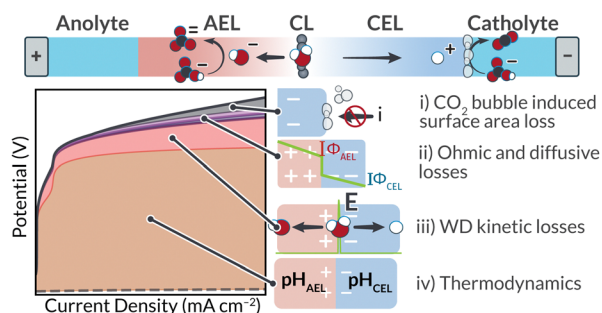
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Unlocking the performance of ternary metal (hydro)oxide amorphous catalysts via data-driven active-site engineering

Doudou Zhang, Haobo Li,* Haijiao Lu, Zongyou Yin, Zelio Fusco, Asim Riaz, Karsten Reuter, Kylie Catchpole and Siva Karuturi*

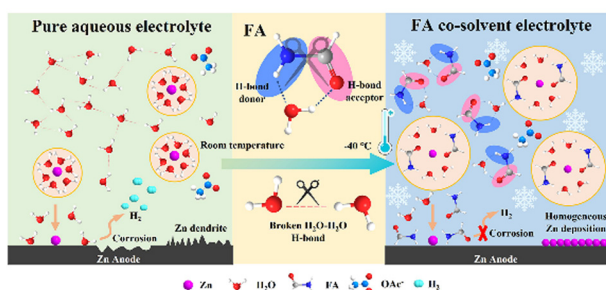
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Analysis of bipolar membranes for electrochemical CO₂ capture from air and oceanwater

Justin C. Bui, Éowyn Lucas, Eric W. Lees, Andrew K. Liu, Harry A. Atwater, Chengxiang Xiang, Alexis T. Bell and Adam Z. Weber*

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An inexpensive electrolyte with double-site hydrogen bonding and a regulated Zn²⁺ solvation structure for aqueous Zn-ion batteries capable of high-rate and ultra-long low-temperature operation

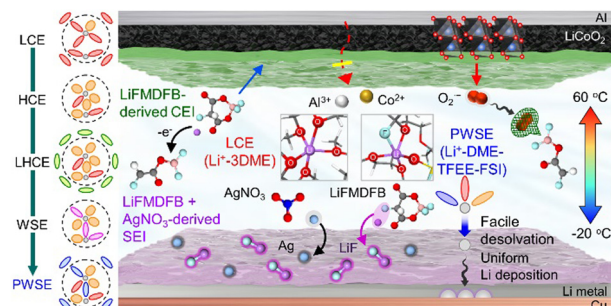
Chaolin You, Ruoyu Wu, Xinhai Yuan, Lili Liu, Jilei Ye, Lijun Fu,* Peng Han* and Yuping Wu*



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Wide-temperature-range operation of lithium-metal batteries using partially and weakly solvating liquid electrolytes

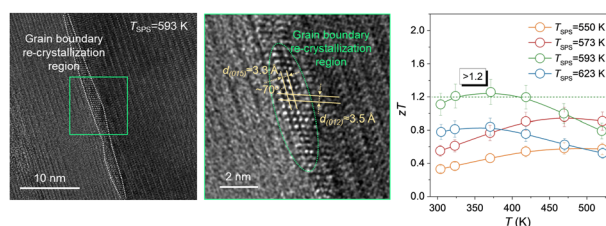
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Grain boundary re-crystallization and sub-nano regions leading to high plateau figure of merit for Bi₂Te₃ nanoflakes

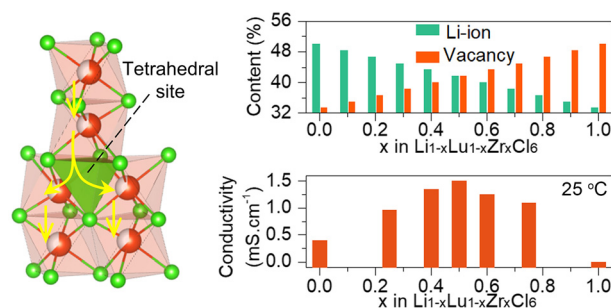
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New insights into aliovalent substituted halide solid electrolytes for cobalt-free all-solid state batteries

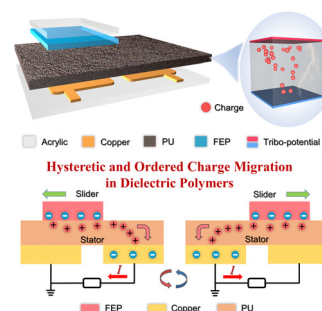
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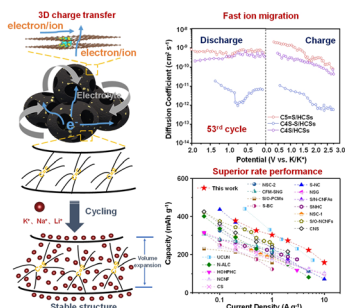
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A constant current triboelectric nanogenerator achieved by hysteretic and ordered charge migration in dielectric polymers

Huiyuan Wu, Jian Wang, Shaoke Fu, Chuncai Shan, Qionghua Zhao, Kaixian Li, Gui Li, Qianjin Mu, Xue Wang* and Chenguo Hu*



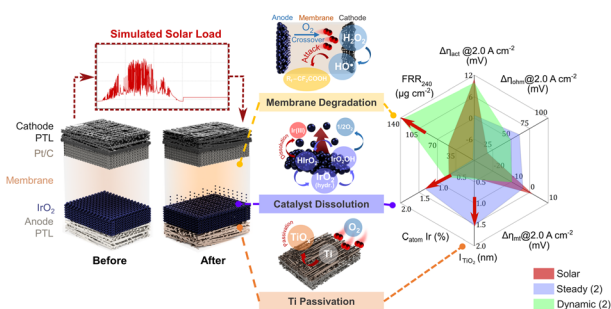
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Delocalized C=S decorates a 3D sp^2 -hybridized carbon skeleton for superior charge transfer kinetics of anodes

Fei Wang, Zhendong Liu, Zhijie Xiang, Chengzhi Zhang,*
Anbang Lu, Fulai Qi, Jun Tan* and Jinshui Liu*

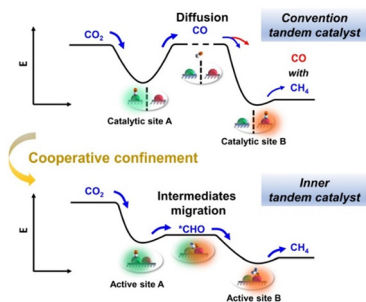
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Systematic degradation analysis in renewable energy-powered proton exchange membrane water electrolysis

Anastasiia Voronova, Sol Kim, Dongwon Kim,
Hee-Young Park, Jong Hyun Jang and Bora Seo*

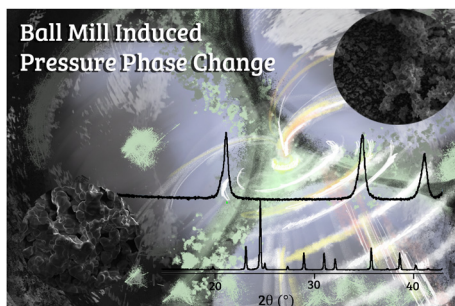
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Atomically inner tandem catalysts for electrochemical reduction of carbon dioxide

Yan Liu,* Huimei Chen, Yan Yang, Chi Jiao, Wenkun Zhu,
Yaping Zhang, Xiaojun Wu, Junjie Mao* and
Zhiwen Zhuo*

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Under pressure: offering fundamental insight into structural changes on ball milling battery materials

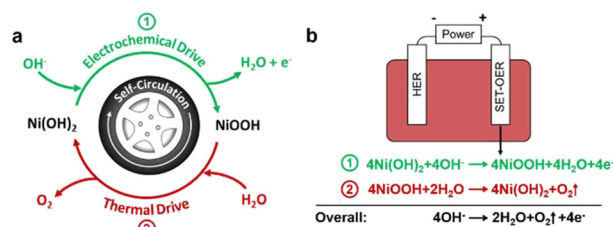
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A self-circulating pathway for the oxygen evolution reaction

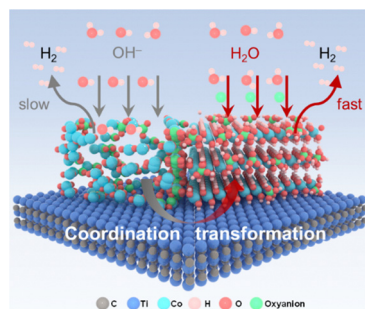
Bohan Deng, Guangqiang Yu, Wei Zhao, Yuanzheng Long, Cheng Yang, Peng Du, Xian He, Zhuting Zhang, Kai Huang,* Xibo Li* and Hui Wu*



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Unveiling coordination transformation for dynamically enhanced hydrogen evolution catalysis

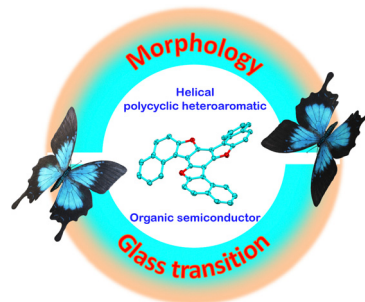
Liming Deng, Sung-Fu Hung, Sheng Zhao, Wen-Jing Zeng, Zih-Yi Lin, Feng Hu, Yaoyi Xie, Lijie Yin, Linlin Li and Shengjie Peng*



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Solution-processable organic semiconductors with over 220 °C glass transition temperature: manipulating morphology using a helical polycyclic heteroaromatic motif

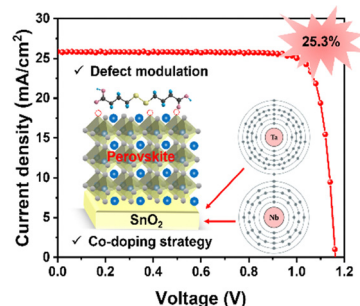
Lingyi Fang, Yuyan Zhang, Yaohang Cai, Jing Zhang, Yuefang Wei, Yi Yuan* and Peng Wang*



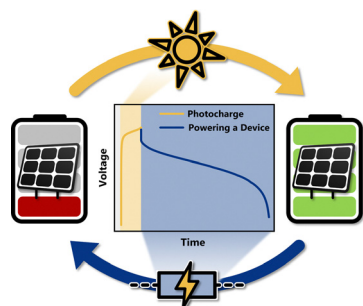
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Synergistic transition metal ion co-doping and multiple functional additive passivation for realizing 25.30% efficiency perovskite solar cells

Yuting Chen, Qi Wang, Yuqi Yao, Jiewei Yang, Weijian Tang, Wuke Qiu, Yihui Wu* and Qiang Peng*



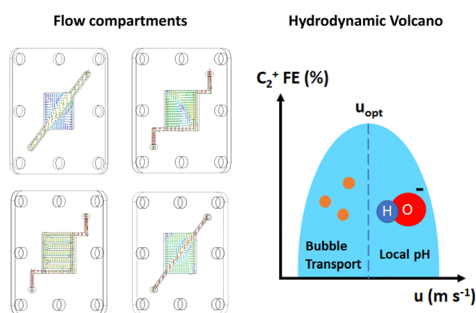
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Organic photo-battery with high operating voltage using a multi-junction organic solar cell and an organic redox-polymer-based battery

Rodrigo Delgado Andrés, Robin Wessling, Jan Büttner, Leonie Pap, Anna Fischer, Birgit Esser* and Uli Würfel*

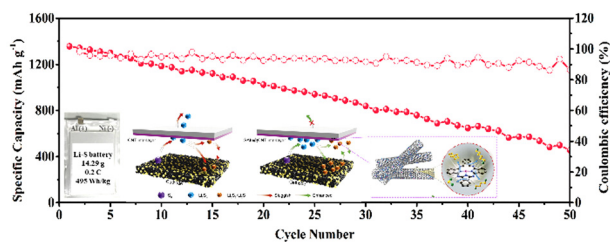
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Understanding the impact of catholyte flow compartment design on the efficiency of CO₂ electrolyzers

Michael Filippi, Tim Möller, Liang Liang and Peter Strasser*

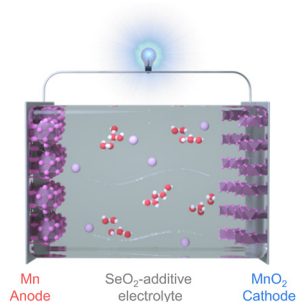
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Engineering a deficient-coordinated single-atom indium electrocatalyst for fast redox conversion in practical 500 W h kg⁻¹-level pouch lithium–sulfur batteries

Yang Guo, Zhaoqing Jin, Jianhao Lu, Lei Wei, Weikun Wang,* Yaqin Huang* and Anbang Wang*

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Aqueous all-manganese batteries

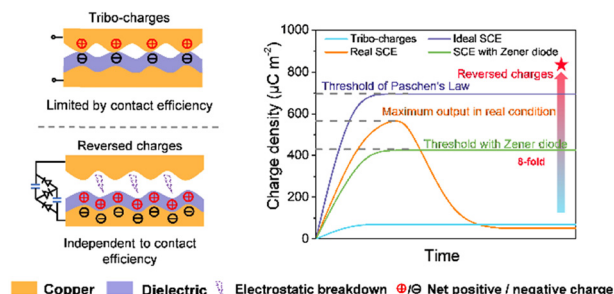
Mingming Wang, Yahan Meng, Yan Xu, Na Chen, Mingyan Chuai, Yuan Yuan, Jifei Sun, Zaichun Liu, Xinhua Zheng, Ziqi Zhang, Dongjun Li and Wei Chen*



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Achieving a highly efficient triboelectric nanogenerator *via* a charge reversion process

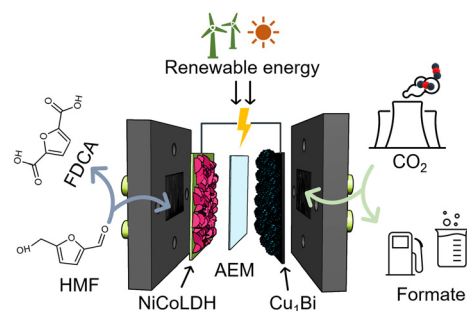
Ziting Guo, Peiyuan Yang, Zhihao Zhao,* Yikui Gao, Jiayue Zhang, Linglin Zhou, Jie Wang* and Zhong Lin Wang*



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A coupled electrocatalytic system with reduced energy input for CO₂ reduction and biomass valorization

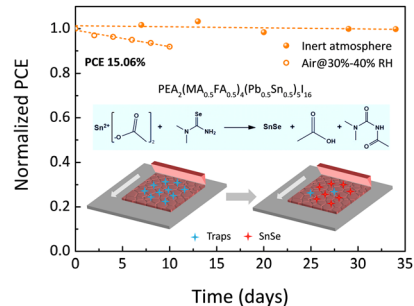
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5315

In situ SnSe deposition as passivation for scalable and stable quasi-2D lead-tin perovskite solar cells

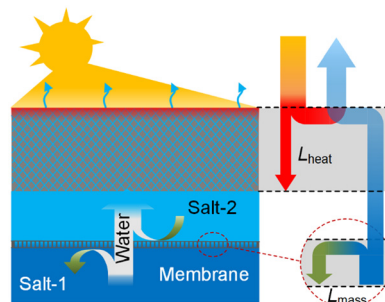
Lijun Chen, Eelco Kinsa Tekelenburg, Kushagra Gahlot, Matteo Pitaro, Jun Xi, Alessia Lasorsa, Giovanna Feraco, Loredana Protesescu, Patrick C. A. van der Wel, Giuseppe Portale, Petra Rudolf, Christoph J. Brabec and Maria Antonietta Loi*



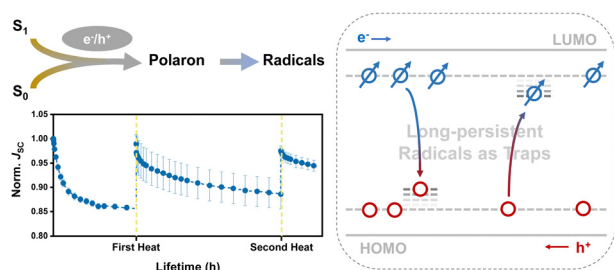
5325

Solar evaporation with solute replacement towards real-world applications

Zhenyuan Xu,* Jie Yu, He Shan, Jiebing Wang, Jintong Gao, Zhanyu Ye and Ruzhu Wang*



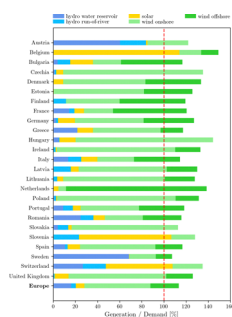
5339



Observation of reversible light degradation in organic photovoltaics induced by long-persistent radicals

Difei Zhang, Chao Liu, Kaicheng Zhang, Yanhua Jia, Wenkai Zhong, Weidong Qiu, Yuanfeng Li, Thomas Heumüller, Karen Forberich, Vincent M. Le Corre, Larry Lürer, Ning Li,* Fei Huang,* Christoph J. Brabec and Lei Ying*

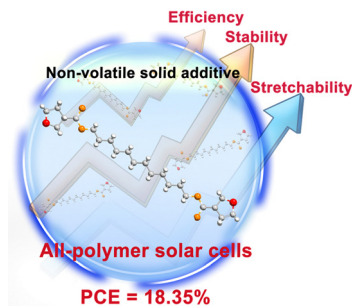
5350



The critical role of electricity storage for a clean and renewable European economy

Alessio Santecchia,* Rafael Castro-Amoedo, Tuong-Van Nguyen, Ivan Kantor, Paul Stadler and François Marechal

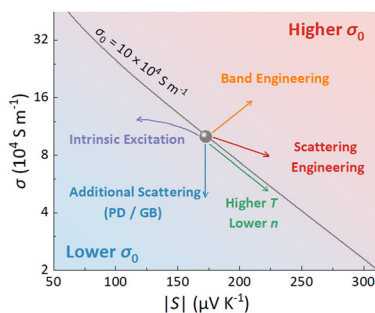
5371



Multifunctional solid additive enables all-polymer solar cells with improved efficiency, photostability and mechanical durability

Jiali Song, Linglong Ye,* Chunhui Liu, Yunhao Cai, Chen Zhang, GuiChu Yue, Yun Li, Min Hun Jee, Yong Zhao, Donghui Wei, Han Young Woo and Yanming Sun*

5381



Intrinsic conductivity as an indicator for better thermoelectrics

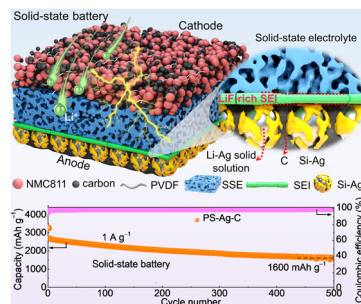
Chaoliang Hu, Ziheng Gao, Min Zhang, Shen Han, Chenguang Fu* and Tiejun Zhu*



5395

Manipulating charge-transfer kinetics and a flow-domain LiF-rich interphase to enable high-performance microsized silicon–silver–carbon composite anodes for solid-state batteries

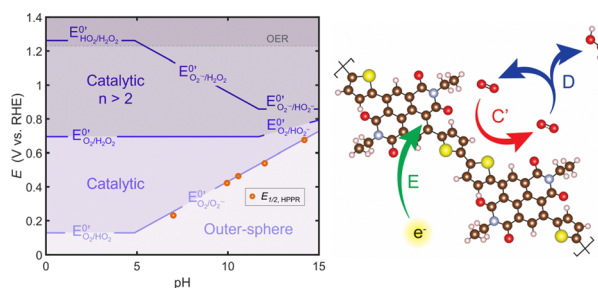
Xiang Han, Lanhui Gu, Zhefei Sun, Minfeng Chen, Yinggan Zhang, Linshan Luo, Min Xu, Songyan Chen, Haodong Liu, Jiayu Wan, Yan-Bing He, Jizhang Chen* and Qiaobao Zhang*



5409

Origins of hydrogen peroxide selectivity during oxygen reduction on organic mixed ionic–electronic conducting polymers

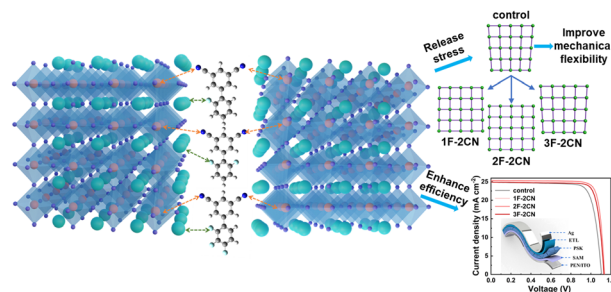
Ana De La Fuente Durán, Allen Yu-Lun Liang, Ilaria Denti, Hang Yu, Drew Pearce, Adam Marks, Emily Penn, Jeremy Treiber, Karrie Weaver, Lily Turaski, Iuliana P. Maria, Sophie Griggs, Xingxing Chen, Alberto Salleo, William C. Chueh, Jenny Nelson, Alexander Giovannitti* and J. Tyler Mefford*



5423

Molecular dipole engineering-assisted strain release for mechanically robust flexible perovskite solar cells

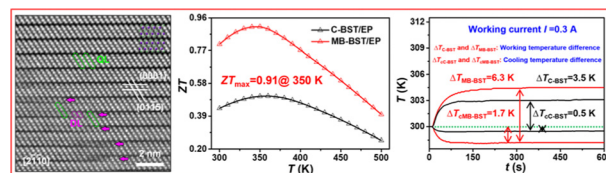
Lisha Xie, Songyu Du, Jun Li, Chang Liu, Zhenwei Pu, Xinyu Tong, Jian Liu, Yaohua Wang, Yuanyuan Meng, Mengjin Yang, Wei Li* and Ziyi Ge*



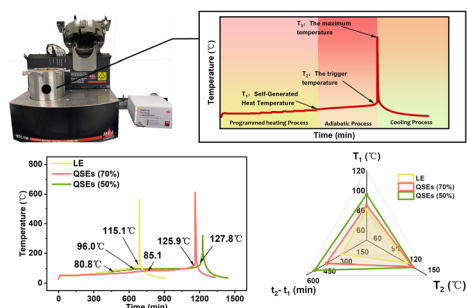
5434

Multi-beam spark plasma sintering and excellent performance of Bi_{0.5}Sb_{1.5}Te₃/epoxy thermoelectric films with insulating substrates

Shaoqiu Ke, Dong Liang, Xiaolei Nie,* Xiaoling Ai, Longzhou Li, Chengshan Liu, Wenjie Xu, Wenjun Cui, Xianfeng Ye, Tiantian Chen, Xiangyu Li, Kai Fu, Wanting Zhu, Ping Wei, Wenyu Zhao* and Qingjie Zhang



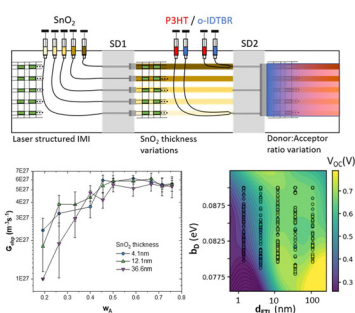
5444



Systematic safety evaluation of quasi-solid-state lithium batteries: a case study

Wei Li, Hang Li, Jiaxiang Liu, Shini Lin, Qichen Chen, Weijie Ji, Zheng He, Peng Zhang* and Jinbao Zhao*

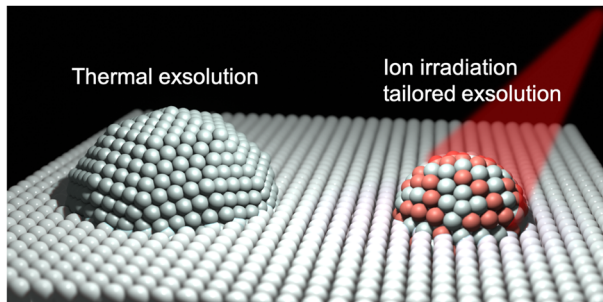
5454



Cutting "lab-to-fab" short: high throughput optimization and process assessment in roll-to-roll slot die coating of printed photovoltaics

Michael Wagner, Andreas Distler, Vincent M. Le Corre, Simon Zapf, Burak Baydar, Hans-Dieter Schmidt, Madeleine Heyder, Karen Forberich,* Larry Lürer, Christoph J. Brabec* and H.-J. Egelhaaf

5464



Ion irradiation to control size, composition and dispersion of metal nanoparticle exsolution

Jiayue Wang, Kevin B. Woller, Abinash Kumar, Zhan Zhang, Hua Zhou, Iradwikanari Waluyo, Adrian Hunt, James M. LeBeau and Bilge Yildiz*

5479



Mimicking ion and water management in poultry breeding for highly reversible zinc ion batteries

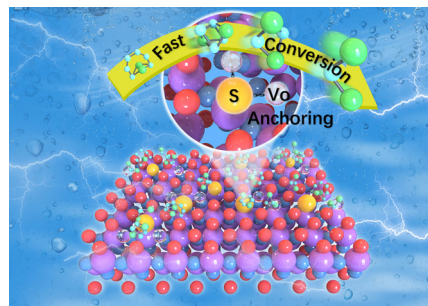
Shengli Zhai, Wanrong Song, Keren Jiang, Xuehai Tan, Wenyao Zhang, Yang Yang, Weifeng Chen, Ning Chen, Hongbo Zeng, Hui Li and Zhi Li*



5490

Highly active and stable oxygen vacancies via sulfur modification for efficient catalysis in lithium–sulfur batteries

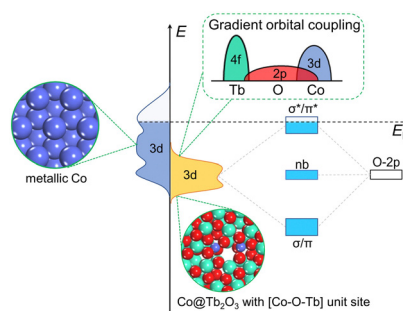
Chenghao Zhao, Bo Jiang, Yang Huang, Xun Sun, Ming Wang, Yu Zhang* and Naiqing Zhang*



5500

Terbium-induced cobalt valence-band narrowing boosts electrocatalytic oxygen reduction

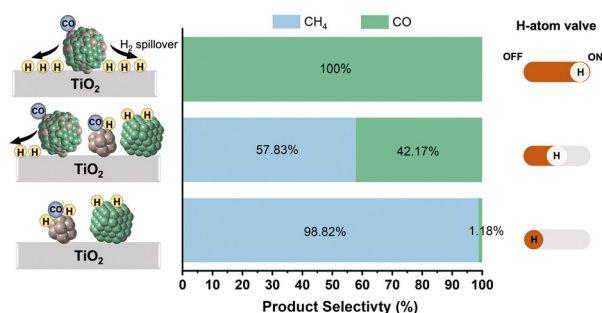
Xuan Wang, Juan Zhang, Pu Wang, Liangcheng Li, Huiyu Wang, Dongmei Sun, Yafei Li, Yawen Tang, Xue Feng Lu,* Yu Wang* and Gengtao Fu*



5513

Structure-performance correlation on bimetallic catalysts for selective CO₂ hydrogenation

Sibei Zou,* Lizhuo Wang, Hao Wang, Xingmo Zhang, Haoyue Sun, Xiaozhou Liao, Jun Huang* and Assaad R. Masri



5525

Redox mediators for oxygen reduction reactions in lithium–oxygen batteries: governing kinetics and its implications

Youngmin Ko, Kyoungoh Kim, Jaekyun Yoo, Giyun Kwon, Hyeokjun Park, Jihyeon Kim, Byungju Lee, Jun-Hyuk Song, Jinsoo Kim and Kisuk Kang*

