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(3) 1325–1864 (2024)

Cover

Inside cover
See Wee-Jun Ong et al., pp. 1453–1464. Image reproduced by permission of Wee-Jun Ong from J. Mater. Chem. A, 2024, 12, 1453.

REVIEWS

1340
Advances in the structural engineering and commercialization processes of hard carbon for sodium-ion batteries
Cheng Yang, Jiahua Zhao, Bo Dong, Ming Lei, Xiwen Zhang, Weibin Xie,* Mingzhe Chen,* Kai Zhang* and Limin Zhou*

1359
Advances in bismuth-based anodes for potassium-ion batteries
Jian Hui Jia, Xiao Feng Lu, Chun Cheng Yang* and Qing Jiang*
RSC Advances

At the heart of open access for the global chemistry community

Editor-in-chief
Russell J Cox
Leibniz Universität Hannover, Germany

We stand for:

**Breadth** We publish work in all areas of chemistry and reach a global readership

**Quality** Research to advance the chemical sciences undergoes rigorous peer review for a trusted, society-run journal

**Affordability** Low APCs, discounts and waivers make publishing open access achievable and sustainable

**Community** Led by active researchers, we publish quality work from scientists at every career stage, and all countries

Submit your work now
rsc.li/rsc-advances

Registered charity number: 207890

@RSC_Adv
REVIEWS

1392

**Optimizing CO₂ photoreduction on bismuth oxyhalides via intrinsic and extrinsic techniques**

Malik Zeeshan Shahid, Zhihao Chen, Rashid Mehmood, Meng Zhang, Danrui Pan, Shishun Xu, Umar Farooq, Ahmed Mahmoud Idris and Zhengquan Li*

---

PERSPECTIVE

1407

**Templated-seeding renders tailored crystallization in perovskite photovoltaics: path towards future efficient modules**

Jing Zhang, Peng Mao, Weihui Bi,* Bing Wang, Yungui Li, Gaorong Han and Yufei Zhong*

---

COMMUNICATIONS

1422

**Steric hindrance driven passivating cations for stable perovskite solar cells with an efficiency over 24%**

Kasparas Rakstys,* Jianxing Xia, Yi Zhang, Kotryna Siksnelyte, Andre Slonopas, Paul J. Dyson, Vytautas Getautis* and Mohammad Khaja Nazeeruddin*

---

1429

**The Nb–Ti–W–O system as safe high-power anodes for Li-ion batteries**

J. Michael Sieffert, Christopher J. Lang, Stephanie Bazylevych, Shipeng Jia and Eric McCalla*
Super-tough self-healable multiphasic supramolecular plastic via sequence-biased statistical copolymerization

Woojin Lee, Yeong Jun Yu, Haisu Kang, Sung Hyun Kwon, Seung Geol Lee, Jae Woo Chung* and Seung-Yeop Kwak*

All-in-one ultrathin nanoporous ZnIn$_2$S$_4$ with ameliorated photoredox capability: harvesting electron–hole pairs in cooperative hydrogen and benzaldehyde production

Grayson Zhi Sheng Ling, Steven Hao Wan Kok, Peipei Zhang, Tan Ji Siang, Choon Yian Haw, Lling-Lling Tan, Binhui Chen and Wee-Jun Ong*

Tailoring composite gel polymer electrolytes with regularly arranged pores and silica particles for sodium metal batteries via breath-figure self-assembly

Da-Sol Kwon, Daun Jeong, Hyun Beom Kang, Wonyoung Chang, Joona Bang and Jimin Shim*

A covalent organic framework based on BOPHY/TiO$_2$ hybrid photocatalysts for solar driven hydrogen production

Tania Mazuelo, Teresa Naranjo,* Miguel Gomez-Mendoza, Alejandro Herrero Pizarro, Laura Collado, Mariam Barawi, Felipe Gándara, Marta Liras* and Victor A. de la Peña O'Shea*
A multifunctional Mg$_2$Si monolayer with negative Poisson's ratio and ultrahigh thermoelectric performance at room temperature

Xin Yu, Wenyuan Jin, Jiafei Pang, Jingning Zuo, Xiaoyu Kuang* and Cheng Lu*

A donor–acceptor hydrogen-bonded organic framework with the turn-on fluorescence response of phenethylamine (drug analogue) via single-crystal to single-crystal transformation

Yanhong Liu, Wenyuan Dan and Bing Yan*

Green synthesis of heterolayered 2D nanohybrid catalytic hydrogel cell for environmentally-friendly water splitting

Seonmyeong Noh, Thanh-Hai Le, Changjun Kim, Minseong Ju, Haney Lee, S. K. Nataraj* and Hyeonseok Yoon*

Potassium supporting electrolyte enhances stability of Ti-substituted polyoxovanadates for nonaqueous redox flow batteries

Mamta Dagar, William W. Brennessel and Ellen M. Matson*
A ZnO@GeSe composite electron transport layer for organic solar cells
Jingyu Tan, Hongye Li, Yapeng Sun, Guanliang Li, Yujun Zhao and Huangzhong Yu*

Unveiling the multifunctional regulation effect of a glutamine additive for highly reversible Zn metal anodes
Junyi Yin, Mingyan Li, Xiang Feng, Tianyi Cui, Jingzhe Chen, Fuxiang Li, Minghui Wang, Yonghong Cheng, Shuijiang Ding, Xin Xu* and Jianhua Wang*

Tetradecaehedral Cu@Ag core–shell powder with high solid-state dewetting and oxidation resistance for low-temperature conductive paste
Yulian Zeng, Shuai Zou, Zhenzhen Chen, Zheng Lu, Mengfei Ni, Chen-Wei Peng, Zipeng Wang, Hua Sun, Xiaohong Zhang and Xiaodong Su*

Low-temperature rapid UV sintering of sputtered TiO₂ for flexible perovskite solar modules
Yongseok Yoo, Gabseok Seo, Hee Jeong Park, Jichan Kim, Jihun Jang, Woosum Cho, Ji Hwan Kim, Jooyeon Shin, Ji Seong Choi, Donghyeon Lee, Se-Woong Baek, Sungkoo Lee, Seong Min Kang,* Min-cheol Kim,* Yung-Eun Sung* and Seunghwan Bae*
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1573</td>
<td>Elevated efficiency and stability of hole-transport-layer-free perovskite solar cells induced by phenethylammonium iodide</td>
<td>Qingbo Wei,* Zhangwen Ye, Yixuan Gao, Nannan Wang, Lina Feng, Qingxia Zhao, Xiufang Hou, Lingxing Zan, Feng Fu* and Dong Yang*</td>
</tr>
<tr>
<td>1582</td>
<td>A novel Cu single-atom catalyst prepared through the adsorption characteristics of MoS₂: from preparation to application</td>
<td>Xu Zhang, Lang Ran, Yajuan Zheng, Heng Zhang, Lingxiao Zhu, Lincheng Zhou* and Hong Zhang*</td>
</tr>
<tr>
<td>1595</td>
<td>Bi-metallic [Cu/Co(6mna)₃]ₙ metal organic chalcogenolate frameworks as high-performance electro-catalysts for dye-sensitized solar cells: a ligand-assisted bottom-up synthesis</td>
<td>Chun-Wei Lai, Yu-Chien Lee, Yi-Zhen Jiang, Chia-Her Lin, Gautam Kumar, Michael H. Huang and Chun-Ting Li*</td>
</tr>
<tr>
<td>1609</td>
<td>A flame-retardant wood-based composite with magnesium–aluminium layered double hydroxides for efficient daytime radiative cooling</td>
<td>Guowei Li, Jiawei Huang, Jian Zhou, Yucheng Zhang, Chuchu Zhang, Zhenggang Rao* and Linfeng Fei*</td>
</tr>
</tbody>
</table>
Structural design of asymmetric gradient alternating multilayered CNF/MXene/FeCo@rGO composite film for efficient and enhanced absorbing electromagnetic interference shielding

Meng Ma,* Wengin Shao, Qindan Chu, Wenting Tao, Si Chen, Yanqin Shi, Huiwen He, Yulu Zhu and Xu Wang*

Accelerating active catalyst discovery: a probabilistic prediction-based screening methodology with applications in dry reforming of methane

Hyundo Park, Jiwon Roh, Hyungtae Cho, Insoo Ro* and Junghwan Kim*

Wood-based electrolyte with reversible phase transition for smart thermal-shutdown self-protection

Qingtao Zeng, Xuejun Lai,* Hongqiang Li, Zhonghua Chen, Xingrong Zeng and Liqun Zhang*

Electrochemically engineered domain: nickel–hydroxide/nickel nitride composite for alkaline HER electrocatalysis

Chikaodili E. Chukwuneke, Kenta Kawashima, Hao Li, Raul A. Marquez, Yoon Jun Son, Lettie A. Smith, Hugo Celio, Graeme Henkelman and C. Buddie Mullins*
1662
Synergetic impact of nitrate-based additives for enhanced solid electrolyte interphase performance
Swastik Basu and Gyeong S. Hwang*

1671
Comparative study of polycrystalline and single-crystal NCM811 cathode materials: the role of crystal defects in electrochemical performance
Boyuan Zhu, Yadong Ning, Ziyang Xu, Guangye Wei* and Jingkui Qu*

1685
A synergetic enhancement strategy of light utilization and carrier transfer for UV photodetection associated with artificial resonance nano-cavities
Zhenpeng Cheng, Zeping Li, Ming-Yu Li,* Xiaoyan Wen, Xumin Ding, Hao Xu, Jihoon Lee, Haifei Lu* and Sisi Liu*

1694
Enhancing ionic conductivity and suppressing Li dendrite formation in lithium batteries using a vinylene-linked covalent organic framework solid polymer electrolyte
Jin Yang, Chenxiao Lin, Yonglei Wang, Yaolin Xu, Duong Tung Pham, Xiangqi Meng, Khanh Van Tran, Sijia Cao, Nikolay Kardjilov, André Hilger, Jan Dirk Epping, Ingo Manke, Arne Thomas* and Yan Lu*
Ultralong lifespan of SuperRedox Capacitor using Ti-doped Li$_3$V$_2$(PO$_4$)$_3$ cathode with suppressed vanadium dissolution
Yuta Harada, Naohisa Okita,* Masahiro Fukuyama, Etsuro Iwama, Wako Naoi and Katsuhiko Naoi*

A high-efficiency NiFeSe$_4$/NiSe$_2$ bifunctional electrocatalyst with outstanding oxygen evolution reaction and overall water splitting performance
Lan Mu, Shipeng Qiu, Gang Zhao,* Baojie Zhang, Wenbo Liao, Ning Zhao and Xijin Xu*

Ce ions and polyaniline co-intercalation into MOF-derived porous V$_2$O$_5$ nanosheets with a synergistic energy storage mechanism for high-capacity and super-stable aqueous zinc-ion batteries
Yibo Zhang, Zhihua Li,* Bo Zhao, Ziyi Wang and Jun Liu

New approaches to three-dimensional positive electrodes enabling scalable high areal capacity
Zhiyong Zhao, Xiaowei Zhang,* Peng Wang, Ioanna Maria Pateli, Hongyi Gao, Ge Wang* and John T. S. Irvine*
1746
An energy harvester based on UV-polymerized short-alkyl-chain-modified [DBU][TFSI] ionic liquid electrets
Topias Järvinen,* Nemanja Vucetic, Petra Palvölgyi, Olli Pitkänen, Tuomo Siponkoski, Helene Cabaud, Robert Vajtai, Jyri-Pekka Mikkola and Krisztian Kordas

1753
Enhanced piezoelectricity and spectral absorption in Nd-doped bismuth titanate hierarchical microspheres for efficient piezo-photocatalytic H₂ production and pollutant degradation
Yan Zhao, Yan Zhang,* Qianqian Xu, Hanyu Gong, Mingyang Yan, Kaiyu Feng, Xiang Zhou, Xuefan Zhou* and Dou Zhang

1764
Photo-enhanced piezocatalytic hydrogen evolution using in situ silver piezodeposited scheelite-type BaMoO₄ and BaWO₄
Talha Kuru, Adem Sarilmaz, Emre Aslan, Faruk Ozel* and Imren Hatay Patir*

1772
Zirconium-metal–organic framework@activated carbon composites for prevention of secondary emission of nerve agents
Cristina Perona, Emilio Borrego-Marín, Pedro Delgado, Rebecca Vismara, Carmen R. Maldonado, Elisa Barea, Teresa J. Bandosz and Jorge A. R. Navarro*
Subnanometric Pt clusters dispersed over Cs-doped TiO₂ for CO₂ upgrading via low-temperature RWGS: operando mechanistic insights to guide an optimal catalyst design
Guillermo Torres-Sempere, Rubén Blay-Roger, Ligia A. Luque-Álvarez, José L. Santos, Luis F. Bobadilla, Laura Pastor-Pérez, Miguel A. Centeno, Willinton Y. Hernández, Ibraheem Yousef, José A. Odriozola and Tomas R. Reina*

Developing an FeₓCoᵧLa₂-based amorphous aerogel catalyst for the oxygen evolution reaction via high throughput synthesis
Bijun Cai, Shaomeng Xu, Zhuyang Chen, Weixuan Li, Ronggui Zhu, Shibo Xi, Chen Xu* and X.-D. Xiang*

Designing a Schottky coupled p–n junction to enhance the kinetic behavior of the oxygen evolution reaction
Guangping Yang, Sining Yun,* Tianxiang Yang, Jiaoe Dang, Yongwei Zhang and Zhiguo Wang

High mass loading porous CoNi₂S₄ nanosheets with ultrahigh areal capacity for flexible supercapacitors
Qian Chen, Ziqiang Wu, Lili Zhu, Changdian Li, Xuebin Zhu* and Yuping Sun
PAPERS

1826
Cutting-edge nitrogen, boron, and fluorine triply doped chain-like porous carbon nanofibers: a versatile solution for high-performance zinc–air batteries and self-powered water splitting
Alagan Muthurasu, Ishwor Pathak, Debendra Acharya, Yagya Raj Rosyara and Hak Yong Kim*

1840
Covalency-aided electrochemical CO₂ reduction to CO on sulfide-derived Cu–Sb
Daniel Yong Yi Goh, Kah Meng Yam, Lavie Rekhi, Albertus Denny Handoko, Ying Chuan Tan, Yong Wang, Joel Ming Rui Tan, Tej Salil Choksi,* Yanwei Lum* and Lydia Helena Wong*

1852
Free-standing multi-hierarchical MoC-based catalyst for pH-universal hydrogen evolution reaction at ultra-high current density
Nan Lu, Yue Liang, Cai-Yun Ren, Xue Liang, Yong-Chao Zhang, Xiao-Dong Zhu* and Jian Gao*

CORRECTION

1862
Correction: Local structure and lithium-ion diffusion pathway of cubic Li₇La₃Zr₂O₁₂ studied by total scattering and the Reverse Monte Carlo method
Haolai Tian, Guanqun Cai, Lei Tan, He Lin, Anthony E. Phillips, Isaac Abrahams, David A. Keen, Dean S. Keeble, Andy Fiedler, Junrong Zhang, Xiang Yang Kong* and Martin T. Dove*