

# Sustainable Energy & Fuels

Interdisciplinary research for the development of sustainable energy technologies

[rsc.li/sustainable-energy](https://rsc.li/sustainable-energy)

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 2398-4902 CODEN SEFUA7 7(17) 4021–4342 (2023)



**Cover**  
See Ángel Galán-Martín *et al.*, pp. 4031–4050. Image reproduced by permission of Ángel Galán-Martín from *Sustainable Energy Fuels*, 2023, 7, 4031.



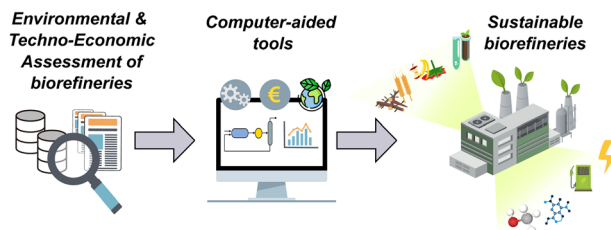
**Inside cover**  
See Qiyang Zhao, Liejin Guo *et al.*, pp. 4094–4109. Image reproduced by permission of Qiyang Zhao from *Sustainable Energy Fuels*, 2023, 7, 4094.

## REVIEWS

4031

### Integrated techno-economic and environmental assessment of biorefineries: review and future research directions

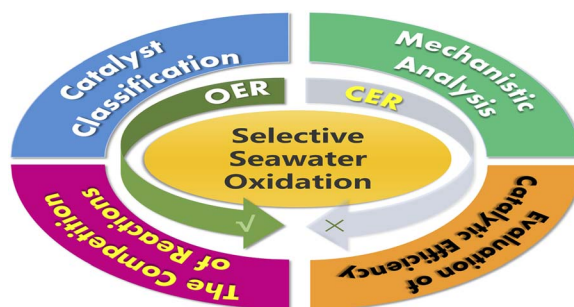
Déborah Pérez-Almada, Ángel Galán-Martín,\* María del Mar Contreras and Eulogio Castro



4051

### Non-noble metal catalysts for preventing chlorine evolution reaction in electrolytic seawater splitting

Zhixi Guan, Lin Yang, Lianhui Wu, Daying Guo,\* Xi'an Chen\* and Shun Wang



**Editorial Staff****Executive Editor**

Neil Scriven

**Deputy Editor**

Sarah Holmes

**Development Editor**

Lily Newton

**Editorial Production Manager**

Claire Darby

**Publisher**

Sam Keltie

**Publishing Editors**

Emma Carlisle, Hannah Hamilton, Ephraim Otumudia, Irene Sanchez Molina Santos, Michael Spenceclay, Callum Woof, Lauren Yarrow-Wright

**Editorial Assistant**

Kate Bando

**Publishing Assistant**

Linda Warncke

For queries about submitted articles, please contact Claire Darby, Editorial Production Manager, in the first instance. E-mail [sustainableenergy@rsc.org](mailto:sustainableenergy@rsc.org)

For pre-submission queries, please contact

Neil Scriven, Executive Editor.

E-mail [sustainableenergy-rsc@rsc.org](mailto:sustainableenergy-rsc@rsc.org)

Sustainable Energy & Fuels (electronic: ISSN 2398-4902) is published 24 times per year by the Royal Society of Chemistry,

Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK

Tel +44 (0)1223 432398; E-mail [orders@rsc.org](mailto:orders@rsc.org)

2023 Annual (electronic) subscription price: £3218; US\$5447. Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at [www.rsc.org/ip](http://www.rsc.org/ip)

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

**Advertisement sales:**

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;

E-mail [advertising@rsc.org](mailto:advertising@rsc.org)

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

# Sustainable Energy & Fuels

[rsc.li/sustainable-energy](http://rsc.li/sustainable-energy)

*Sustainable Energy & Fuels* publishes high quality scientific research that will drive development of sustainable energy technologies, with a particular emphasis on innovative concepts and approaches.

**Editorial Board****Editor-in-Chief**

Garry Rumbles, National Renewable Energy Laboratory and University of Colorado Boulder, USA

**Associate Editors**

Ryu Abe, Kyoto University, Japan  
Francesca Brunetti, University of Rome Tor Vergata, Italy  
David Mitlin, The University of Texas at Austin, USA

Marta Sevilla, Instituto Nacional del Carbón - CSIC, Spain  
Carsten Streb, Johannes Gutenberg University Mainz, Germany  
Xinchen Wang, Fuzhou University, China  
Karen Wilson, Griffith University, Australia

**Advisory Board**

Jessica Allen, University of Newcastle, Australia  
Vincent Artero, Université Grenoble Alpes, CNRS, CEA, France  
Chunmei Ban, University of Colorado, USA  
Christoph Brabec, University of Erlangen-Nuremberg, Germany  
Jaephil Cho, Ulsan National Institute of Science and Technology (UNIST), South Korea  
Cyrille Costentin, Université Grenoble Alpes, France  
Seth Darling, Argonne National Laboratory, USA  
Benjamin Dietzek, Jena Institute of Photonics, Germany  
Gordana Dukovic, University of Colorado Boulder, USA  
James Durrant, Imperial College London and Swansea University, UK  
Heinz Frei, Lawrence Berkeley National Laboratory, USA  
Elizabeth Gibson, University of Newcastle, UK  
Susan Habas, National Renewable Energy Laboratory, USA  
Anders Hagfeldt, Uppsala University, Sweden  
Justin Hodgkiss, Victoria University of Wellington, New Zealand  
Osamu Ishitani, Tokyo Institute of Technology,

Japan  
Anne Jones, Arizona State University, USA  
Kisuk Kang, Seoul National University, South Korea  
Frédéric Laquai, KAUST, Saudi Arabia  
Lieve Laurens, National Renewable Energy Laboratory, USA  
Shirley Meng, Dalian Institute of Chemical Physics, China  
Doug MacFarlane, Monash University, Australia  
Chris McNeill, Monash University, Australia  
Shirley Meng, University of Chicago, USA  
Johannes Messinger, Uppsala University, Sweden  
Robert Mokaya, University of Nottingham, UK  
Annamma Odaneth, Institute of Chemical Technology, India  
Satishchandra Ogale, Indian Institute of Science Education and Research, Pune, India  
Jude Onwudili, Aston University, UK  
Martin Oschatz, Friedrich-Schiller-University Jena, Germany  
Emilio Palomares, Catalan Institute of Chemical Research, Spain  
Xiulian Pan, Dalian Institute of Chemical Physics, China

Alissa Park, Columbia University, USA  
Nam-Gyu Park, Sungkyunkwan University, South Korea  
Volker Presser, Leibniz Institute for New Materials, Germany  
Amy Prieto, Colorado State University, USA  
Liangti Qu, Tsinghua University, China  
Erin Ratcliff, University of Arizona, USA  
Srinivasan Sampath, Indian Institute of Science, India  
Kimberley See, California Institute of Technology, USA  
Uwe Schroder, TU-Braunschweig, Germany  
Wendy Shaw, Pacific Northwest National Laboratory, USA  
Adalgisa Sinicropi, University of Siena, Italy  
Junwang Tang, University College London, UK  
Roel van de Krol, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany  
Koen Vandewal, Dresden University of Technology, Germany  
Aron Walsh, Imperial College London, UK  
Aiqin Wang, Dalian Institute of Chemical Physics, China  
Michael Wasielewski, Northwestern University, USA  
Yan Yao, University of Houston, USA

**Information for Authors**

Full details on how to submit material for publication in Sustainable Energy & Fuels are given in the Instructions for Authors (available from <http://www.rsc.org/authors>). Submissions should be made via the journal's homepage: [rsc.li/sustainable-energy](http://rsc.li/sustainable-energy)

Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)–Reproduced by permission of the Royal Society of Chemistry.

This journal is © The Royal Society of Chemistry 2023.

Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

Registered charity number: 207890

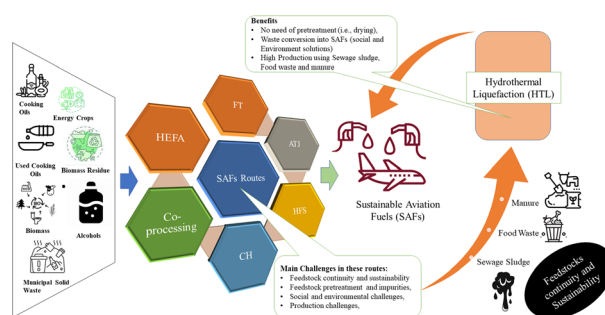


## REVIEWS

4066

## The future of aviation soars with HTL-based SAFs: exploring potential and overcoming challenges using organic wet feedstocks

Muhammad Usman, Shuo Cheng, Sasipa Boonyubol and Jeffrey S. Cross\*

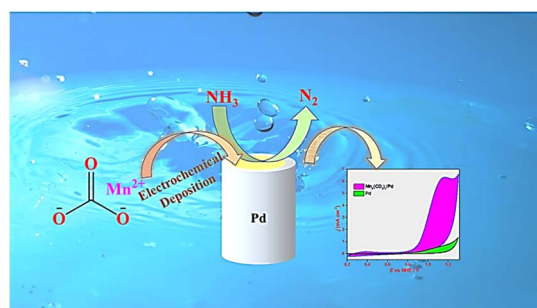


## COMMUNICATION

4088

## Manganese carbonate as an efficient electrocatalyst for the conversion of ammonia ( $\text{NH}_4^+/\text{NH}_3$ ) to dinitrogen

Iranna Udachyan, Jayesh T. Bhanushali, Amir Mizrahi, Tomer Zidki and Dan Meyerstein\*

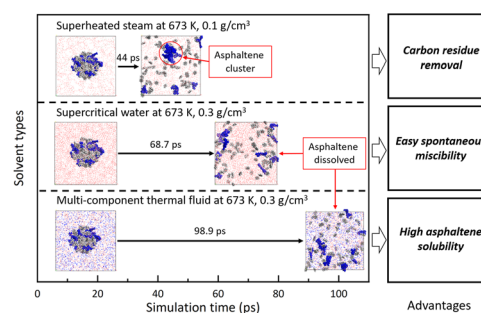


## PAPERS

4094

## Molecular dynamics simulation of heavy oil dissolution in supercritical water and multi-component thermal fluid

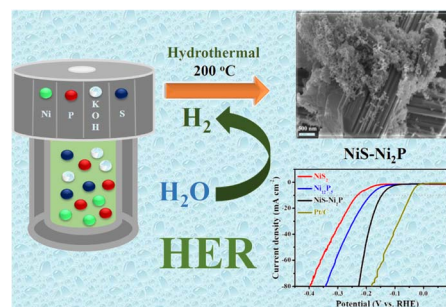
Qiuyang Zhao,\* Lichen Zheng, Yu Dong, Hui Jin, Yechun Wang and Liejin Guo\*



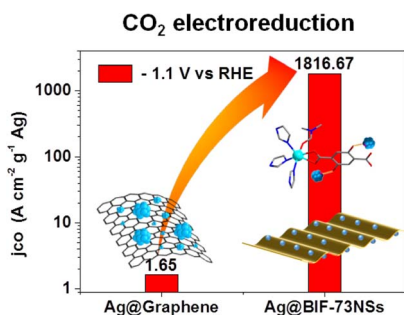
4110

## A phase-engineered nickel sulfide and phosphide ( $\text{NiS-Ni}_2\text{P}$ ) heterostructure for enhanced hydrogen evolution performance supported with DFT analysis

Jiban K. Das, Nachiketa Sahu, Pratap Mane, Brahmananda Chakraborty and J. N. Behera\*



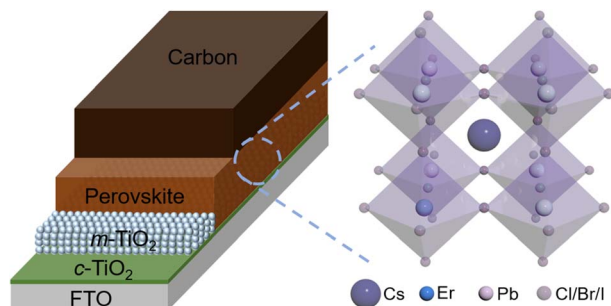
4120



### Hydroxyl reduced silver nanoparticles on ultrathin boron imidazolate framework nanosheets for electrocatalytic CO<sub>2</sub> reduction

Ping Shao, Luocai Yi, Jun-Qiang Chen, Changsheng Cao, Hai-Xia Zhang\* and Jian Zhang\*

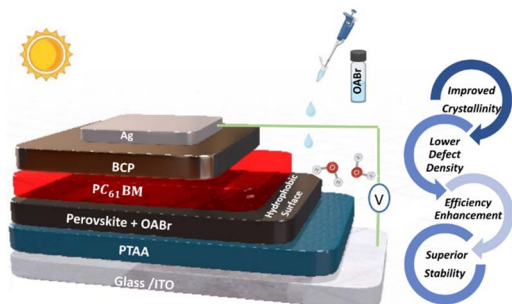
4127



### Erbium-doped CsPbI<sub>2.5</sub>Br<sub>0.5</sub> with enhanced crystalline quality and improved carrier lifetime for thermally stable all-inorganic perovskite solar cells

Mengfei Zhu, Lina Qin, Yuren Xia, Yi Hu, Xinmei Song, Daocheng Hong, Yuxi Tian, Zuoxiu Tie\* and Zhong Jin\*

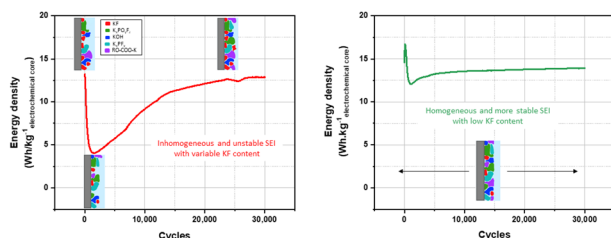
4136



### An efficient approach for controlling the crystallization, strain, and defects of the perovskite film in hybrid perovskite solar cells through antisolvent engineering

Nikolaos Tzoganakis, Konstantinos Chatzimanolis, Emmanuel Spiliarotis, George Veisakis, Dimitris Tsikritzis\* and Emmanuel Kymakis

4150



### Study of the influence of the formation protocol on the SEI layer formed at the graphite electrode surface of a non-aqueous potassium-ion hybrid supercapacitor (KIC) through STEM and XPS analyses

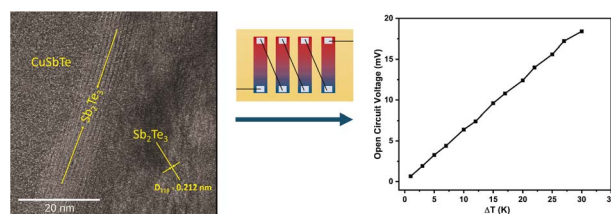
Marie-Eve Yvenat,\* Benoit Chavillon, Eric Mayousse, Eric De Vito, Adrien Boulineau, Fabien Perdu and Philippe Azais



4160

### Electrodeposited CuSbTe thin films with enhanced thermoelectric performance

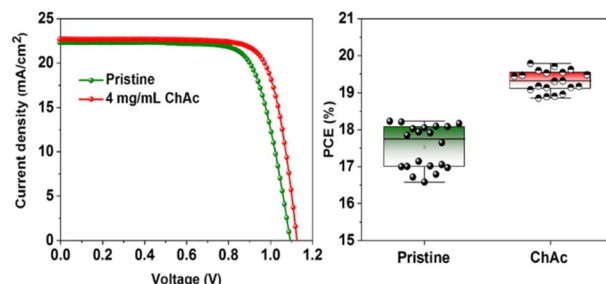
Amit Tanwar, Rajvinder Kaur, N. Padmanathan\* and Kafil M. Razeeb\*



4172

### Interface passivation using choline acetate for efficient and stable planar perovskite solar cells

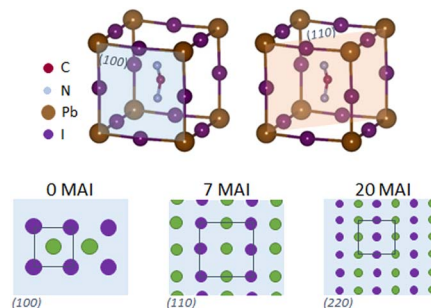
M. Thambidurai, Herlina Arianita Dewi, Wang Xizu, Nripan Mathews, Cuong Dang\* and Hung D. Nguyen\*



4179

### Revealing the impact of the host-salt non-stoichiometry on the performance of perovskite solar cells

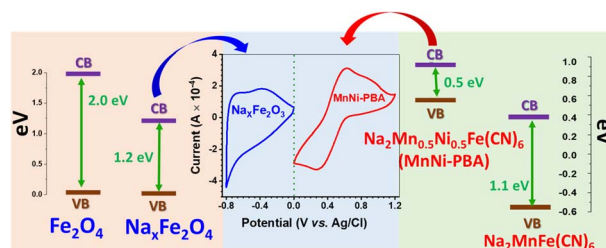
Amit Kumar, Bhanu Pratap Dhamaniya, Shailendra Kumar Gupta, Priyanka Chhillar, Kartiki Chandratre, Sandeep Kumar Pathak and Supravat Karak\*



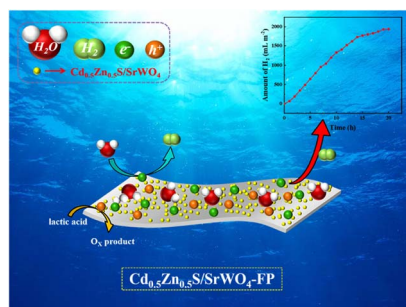
4189

### Low cost & quasi solid state Na<sub>2</sub>Mn<sub>0.5</sub>Ni<sub>0.5</sub>Fe(CN)<sub>6</sub>//Na<sub>x</sub>Fe<sub>2</sub>O<sub>3</sub> hybrid Na-ion batteries for solar energy storage

Pappu Naskar, Shubhrajyoti Mondal, Biplab Biswas, Sourav Laha\* and Anjan Banerjee\*



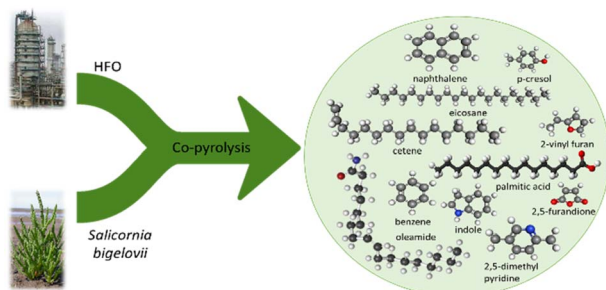
4202



### Facile fabrication of a flexible and shape-adaptive $\text{Cd}_{0.5}\text{Zn}_{0.5}\text{S}$ -based photocatalytic system and its photocatalytic activity for hydrogen evolution from water

Hui Liu, Luyao Xin, Lixia Qin, Taiyang Zhang, Xiangqing Li and Shi-Zhao Kang\*

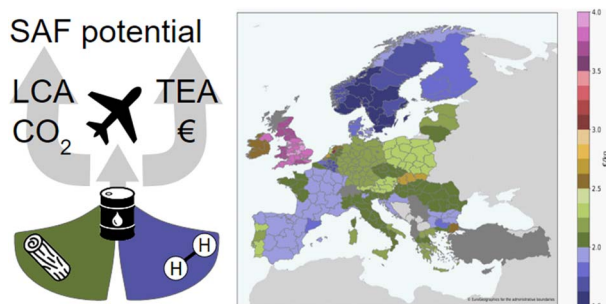
4213



### Interactions in co-pyrolysis of *Salicornia bigelovii* and heavy fuel oil

Jinan Aljaziri,\* Ribhu Gautam\* and S. Mani Sarathy

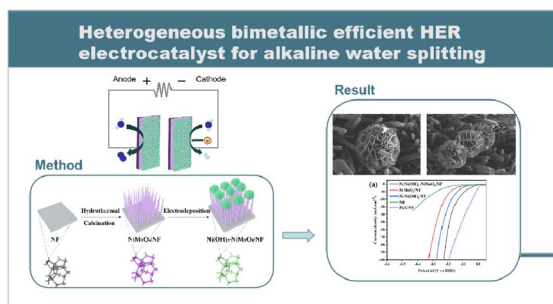
4229



### Sustainable aviation fuel from forestry residue and hydrogen – a techno-economic and environmental analysis for an immediate deployment of the PBtL process in Europe

Felix Habermeyer,\* Veatriki Papantoni, Urte Brand-Daniels and Ralph-Uwe Dietrich

4247



### Heterogeneous bimetallic $\text{Ni}(\text{OH})_2\text{-NiMoO}_4/\text{NF}$ as an efficient HER electrocatalyst for alkaline water splitting

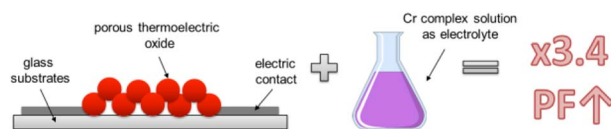
Jianzhi Wang, Jie Yang, Yanjun Yu, Yanan Xue, Yu Luo, Ziyi Guo, Hongliang Yu, Hui Li\* and Faquan Yu\*



4254

### Power factor improvement in a solid–liquid thermoelectric system formed by Sb:SnO<sub>2</sub> in contact with a chromium complex solution

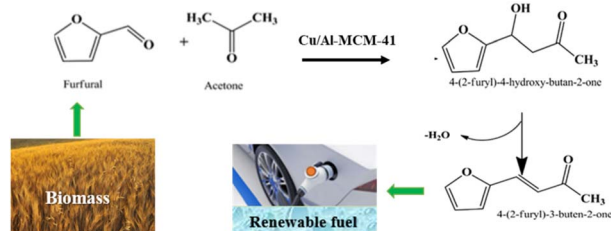
S. Castro-Ruiz, L. Márquez-García, M. Solís-de la Fuente, B. Beltrán-Pitarch, A. Mota-Babiloni, F. Vidan, P. Íñigo-Rabinal, G. Guisado-Barrios and J. García-Cañadas\*



4260

### Renewable fuel intermediates from furfural over copper-loaded mesoporous aldol condensation catalysts

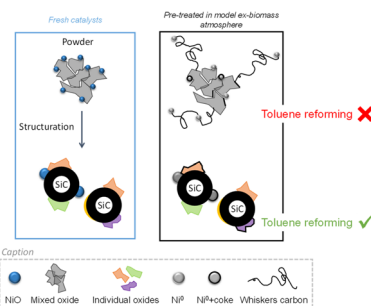
Priyanga Gandhi, Biswajit Saha, Sundaramurthy Vedachalam and Ajay K. Dalai\*



4273

### Enhancing the catalytic performance of Ni based catalysts in toluene reforming at low temperature by structuring on SiC extrudates

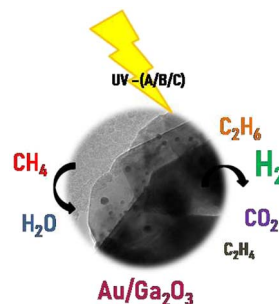
Lole Jurado,\* Michaël Martin Romo y Morales, Sébastien Thomas and Anne-Cécile Roger



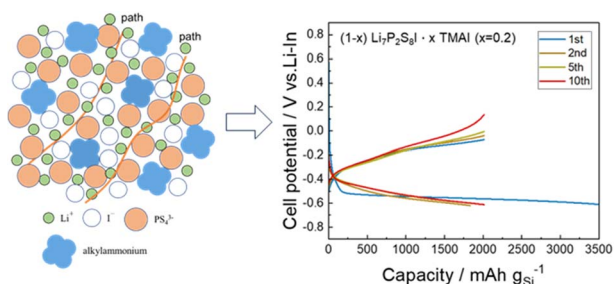
4288

### Methane conversion coupled with hydrogen production from water using Au/Ga<sub>2</sub>O<sub>3</sub> photocatalysts prepared by different methods

Eliane R. Januario,\* Saulo A. Carminati, Aryane Tofanello, Bruno L. da Silva, Patricia F. Silvaino, Arthur P. Machado, Jorge M. Vaz and Estevam V. Spinacé



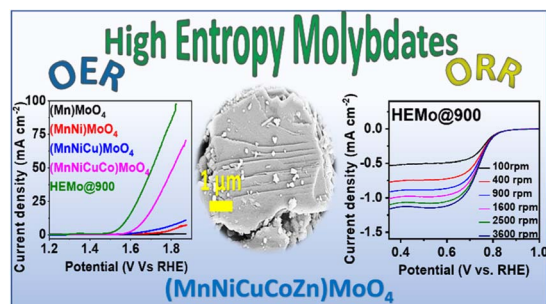
4297



### Inorganic–organic hybrid solid electrolytes in the tetramethylammonium iodide–LiI–Li<sub>2</sub>S–P<sub>2</sub>S<sub>5</sub> system for all-solid-state lithium batteries

Tong Fang, Hikaru Tokiwa, Akira Miura and Kiyoharu Tadanaga\*

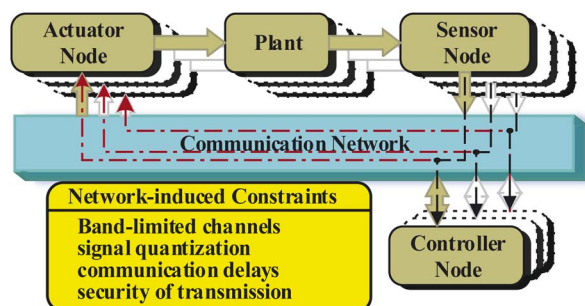
4303



### Achieving favourable oxygen electrocatalytic activity with compositionally complex metal molybdates

Hemanth Kumar Beere, Pranav Kulkarni, Uday Narayan Maiti, R. Geetha Balakrishna, Priyam Mukherjee, Hyun Young Jung, Ketaki Samanta and Debasis Ghosh\*

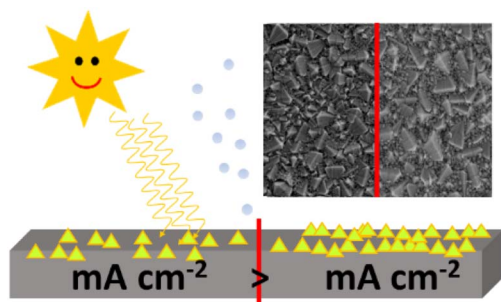
4317



### Dynamic event-triggered $H_{\infty}$ quantized load frequency control for interconnected wind power systems under stochastic delay deception attack

Hanmei Zhou, Qishui Zhong,\* Shaoyu Hu, Jin Yang, Kaibo Shi and Shouming Zhong

4332



### Seed layer formation determines photocurrent response of hydrothermally-grown WO<sub>3</sub> photoanodes

Mirco Ade, Lion Schumacher and Roland Marschall\*

