

# Sustainable Energy & Fuels

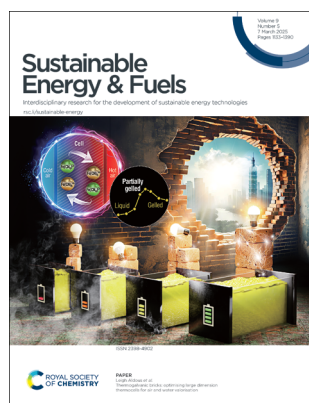
Interdisciplinary research for the development of sustainable energy technologies

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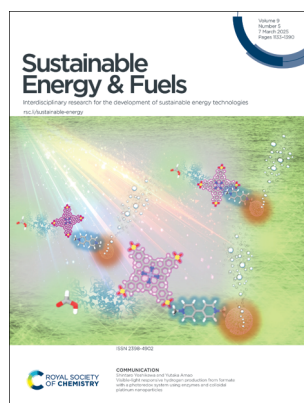
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## IN THIS ISSUE

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**Cover**  
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**Inside cover**  
See Shintaro Yoshikawa and Yutaka Amao, pp. 1160–1164. Image reproduced by permission of Yutaka Amao from *Sustainable Energy Fuels*, 2025, 9, 1160.

## PERSPECTIVE

1142

### An intelligent battery management system (BMS) with end-edge-cloud connectivity – a perspective

Sai Krishna Mulpuri, Bikash Sah\* and Praveen Kumar

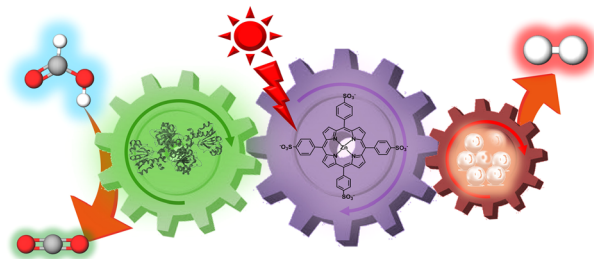


## COMMUNICATION

1160

### Visible-light responsive hydrogen production from formate with a photoredox system using enzymes and colloidal platinum nanoparticles

Shintaro Yoshikawa and Yutaka Amao\*





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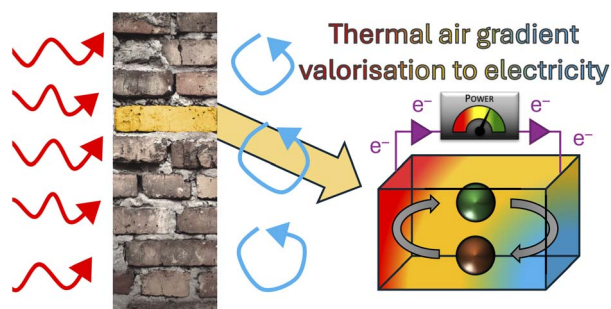


## PAPERS

1165

**Thermogalvanic bricks: optimising large dimension thermocells for air and water valorisation**

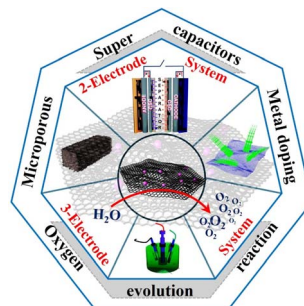
Rebecca Haughton-James, Sireenya Mesawang, Mark A. Buckingham, Robert Taylor, Patrick E. Phelan and Leigh Aldous\*



1173

**Elucidating the role of cobalt nanoparticles and Mn-phosphate in etched ZIF-67/phthalimide-NC and phthalimene oxide for supercapacitor and electrochemical oxygen evolution reaction applications**

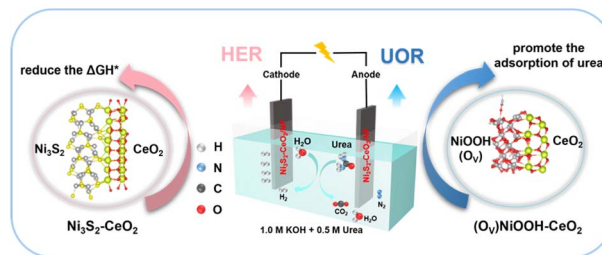
Tapan Dey, Nitish Kumar, Rahul Patil, Prakash Kumar Pathak, Sudip Bhattacharjee, Praveen Yadav, Asim Bhaumik, Rahul R. Salunkhe\* and Saikat Dutta\*



1183

**CeO<sub>2</sub>-enhanced surface reconstruction of Ni<sub>3</sub>S<sub>2</sub> nanosheets for improved urea-assisted water splitting performance**

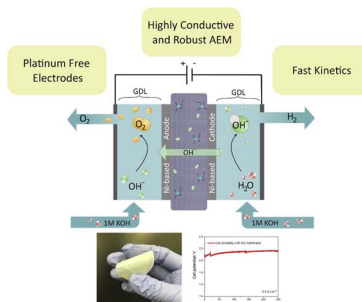
Jiale Shang, Tong Wei, Xiaoqing Yan, Zheng Fang, Leilei Du, Jichao Shi, Fozia Sultana,\* Tongtong Li\* and Renhong Li\*



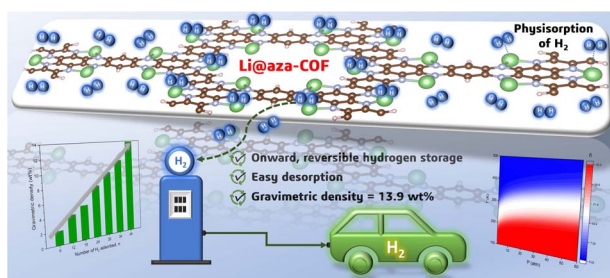
1196

**Hydroxyl-conductive 2D hexagonal boron nitrides for anion exchange membrane water electrolysis and sustainable hydrogen production**

Jasneet Kaur,\* Matthew Schweinbenz, Kane Ho, Adel Malekkhouyan, Kamal Ghotia, Franz Egert, Fatemeh Razmjooei,\* Syed Asif Ansar and Hadis Zarrin\*



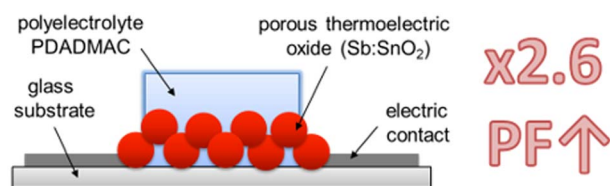
1207



## Li-doped 2D aza-fused covalent organic framework: a promising avenue for hydrogen storage

Preeti Beniwal and T. J. Dhillip Kumar\*

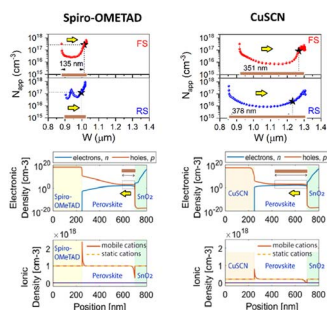
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## Poly(diallyldimethylammonium)-based solid electrolytes to significantly enhance the power factor of a thermoelectric oxide film (Sb-doped SnO<sub>2</sub>)

M. Solis-de la Fuente, S. Castro-Ruiz, L. Márquez-García, P. Rullière, S. Fantini, R. Del Olmo, N. Casado and J. García-Cañadas\*

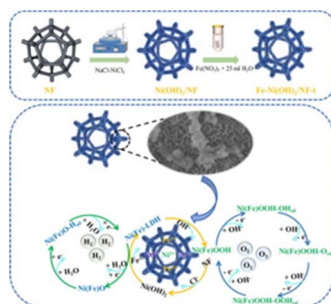
1225



## Impact of the hole transport layer on the space charge distribution and hysteresis in perovskite solar cells analysed by capacitance–voltage profiling

E. Regalado-Pérez,\* Evelyn B. Díaz-Cruz and J. Villanueva-Cab\*

1236



## Low-temperature etch synthesis of Fe-doped Ni(OH)<sub>2</sub> for enhanced bifunctional water splitting

Yanmei Xin, Xiaoru Dou, Qiling Yan, Ruiting Zhang, Shuaishuai Li,\* Guoan Huang\* and Zhonghai Zhang\*

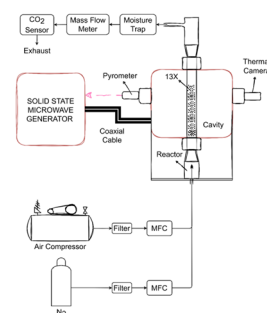


## PAPERS

1247

# An experimental study on microwave-assisted direct air capture of CO<sub>2</sub> under fluidized bed conditions

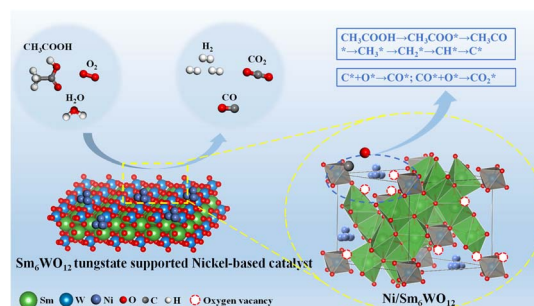
Mustafa Erguvan,<sup>\*</sup> Rahim Boylu, Matheus Strobel and Shahriar Amini<sup>\*</sup>



1268

# Sm<sub>6</sub>WO<sub>12</sub> tungstate supported nickel-based catalysts with enhanced resistance to coking and oxidation in auto-thermal reforming of acetic acid

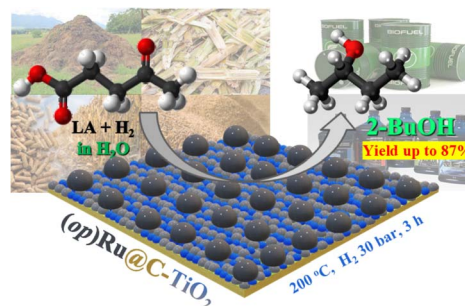
Xuemei Xie, Yingchun Xu, Mao Gan, Ying Su, Jinbo Liu and Lihong Huang<sup>\*</sup>



1279

# Thermocatalytic synthesis of 2-butanol from biomass-derived levulinic acid using carbon-doped titania-supported ruthenium

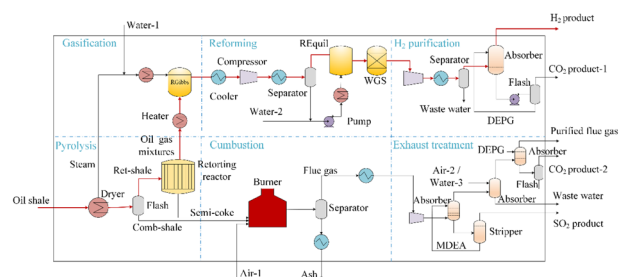
Atina Sabila Azzahra, Rodiansono,<sup>\*</sup> Iryanti Fatyasari Nata, Kiky Corneliasari Sembiring, Indri Badria Adilina and Ahmad Afandi



1293

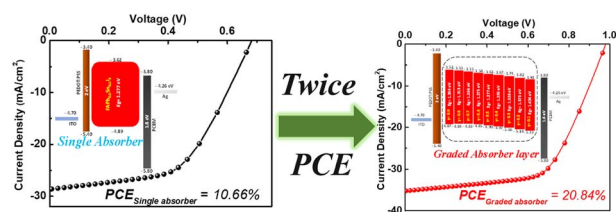
# Complete hydrogen production from oil shale with carbon capture

Pu Zheng, Xiaoxiang Wang, Dandan Li, Zhongmin Wu, Weijia Huang, Yun Li, Jie Zhang and Xiaohui Chen<sup>\*</sup>



## PAPERS

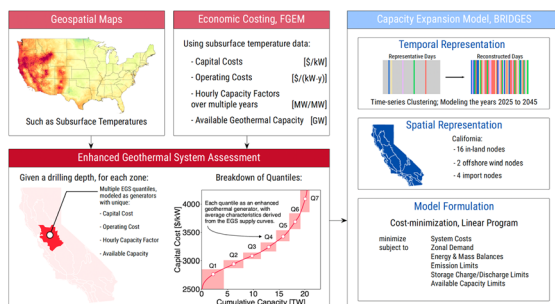
1305



### Theoretical estimation to double the performance of perovskite solar cells using a graded absorber layer

Monisha Nayak, Abu Jahid Akhtar and Sudip K. Saha\*

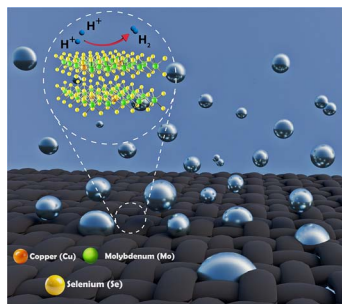
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### The value of enhanced geothermal systems for the energy transition in California

Mohammad J. Aljubran,\* Dimitri M. Saad, Mo Sodwatana, Adam R. Brandt and Roland N. Horne

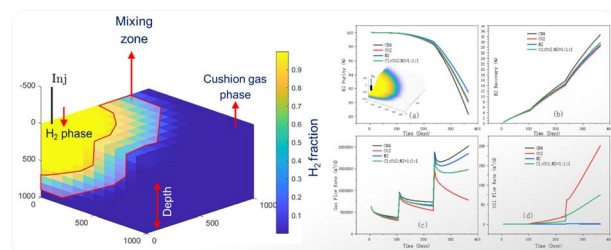
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### Triggering the phase transition of molybdenum diselenide (MoSe<sub>2</sub>) 1T@2H by introducing copper (Cu<sup>+</sup>): experimental insights and DFT analysis for the hydrogen evolution reaction

Gautham Kumar G, P. Balaji Bhargav,\* C. Balaji and Shobana Priyanka D

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### A sensitivity study of hydrogen mixing with cushion gases for effective storage in porous media

Junhan Lu, Nasiru Salahu Muhammed, Jude A. Okolie and Emmanuel I. Epelle\*

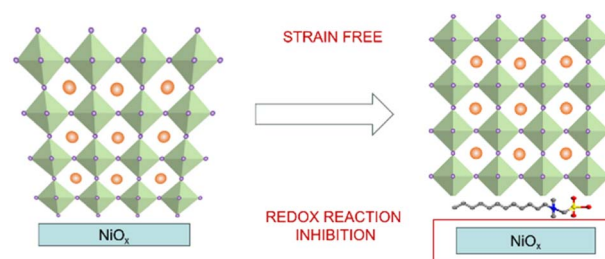


## PAPERS

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### Surface engineering to mitigate compressive stress and detrimental reactions in $\text{NiO}_x$ -based inverted perovskite solar cells

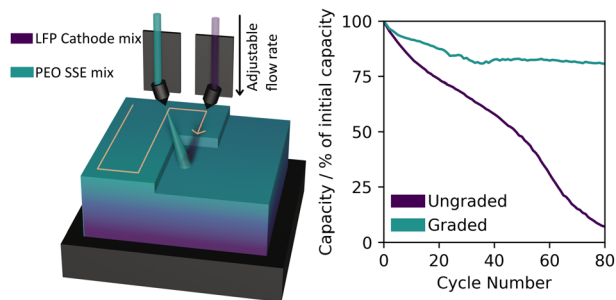
Zijin Qiao, Hongye Dong, Guibin Shen, Xiangning Xu, Wang Yao and Cheng Mu\*



1379

### Enhancing solid-state battery performance with spray-deposited gradient composite cathodes

Matt P. Tudball, Will J. Dawson, Joshua H. Cruddos, Francesco Iacoviello, Andrew R. T. Morrison, Alexander J. E. Rettie and Thomas S. Miller\*



## CORRECTION

1387

### Correction: Photocatalytic $\text{CO}_2$ reduction to methanol integrated with the oxidative coupling of thiols for S–X (X = S, C) bond formation over an $\text{Fe}_3\text{O}_4/\text{BiVO}_4$ composite

Nitish Saini, Sandhya Saini, Santanu Majumder,\* Kyra Sedransk Campbell and Suman L. Jain\*

