

# Catalysis Science & Technology

A multidisciplinary journal focussing on all fundamental science and technological aspects of catalysis  
[rsc.li/catalysis](http://rsc.li/catalysis)

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 2044-4761 CODEN CSTAGD 15(1) 1-222 (2025)



### Cover

See Hajime Kawanami et al.,

pp. 52-61.

Image reproduced by permission of Hajime Kawanami from *Catal. Sci. Technol.*, 2025, 15, 52.



### Inside cover

See Andrew C. Chien and Corinna C. Chi,

pp. 62-70.

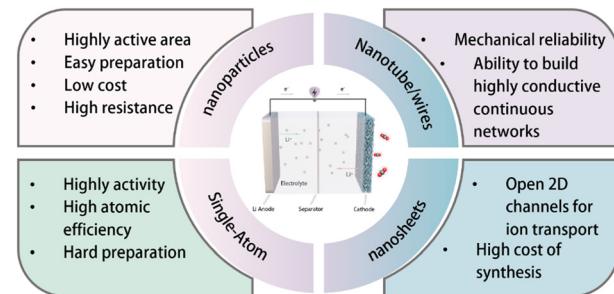
Image reproduced by permission of Andrew C. Chien from *Catal. Sci. Technol.*, 2025, 15, 62.

## REVIEW

11

### Scale and morphology design of metal-based catalysts for enhanced Li-CO<sub>2</sub> battery performance

Jingzhao Wang, Xiangming Cui, Mi Zhou, Xin Chen, Shiyi Sun, Kai Yang, Jianan Wang\* and Wei Yan

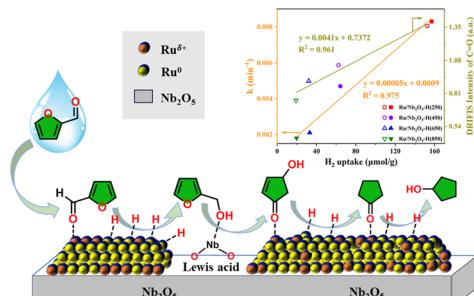


## COMMUNICATIONS

33

### Correlation of the catalytic performance with Ru<sup>δ+</sup> species on Ru/Nb<sub>2</sub>O<sub>5</sub> in furfural aqueous reductive conversion

Yulong Deng, Binyu Zhang, Huiru Wu, Zhuo He, Xiaorui Du, Jiayi Ou, Tianyu Ren, Haiyong Wang, Yuhe Liao, Qiying Liu,\* Chenguang Wang\* and Yanbin Cui\*



# EES Batteries

**Exceptional research on  
batteries and energy storage**

Part of the EES family

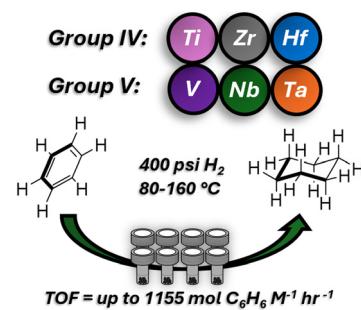
**Join  
in** | Publish with us  
[rsc.li/EESBatteries](http://rsc.li/EESBatteries)

Registered charity number: 207890



## COMMUNICATIONS

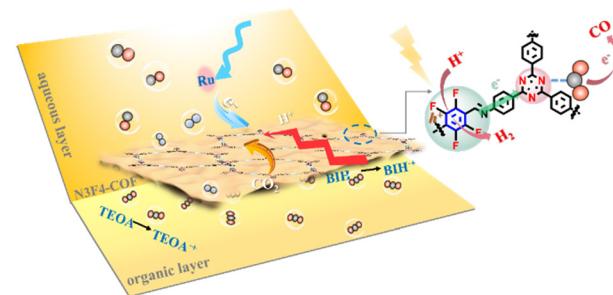
41

**Benzene hydrogenation utilizing organometallic early transition metal precursors**Reece Johnson, Peijie Hu, James Pugh,  
Rahul Koottanil Haridasan and Keith Searles\*

46

**Fluorinated covalent organic frameworks for visible-light driven  $CO_2$  reduction**

Wei-Jia Wang,\* Bin Li, Jing Gao and Kaihong Chen\*



## PAPERS

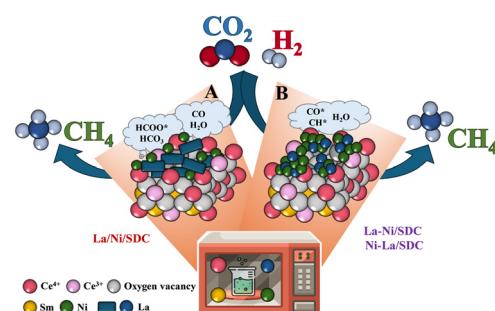
52

**Iridium complexes supported on cross-linked polyacrylic acid as release-and-catch catalysts for continuous formic acid dehydrogenation**Keito Sawahara, Shinji Tanaka, Ryota Gemma,  
Ryoichi Kanega and Hajime Kawanami\*

62

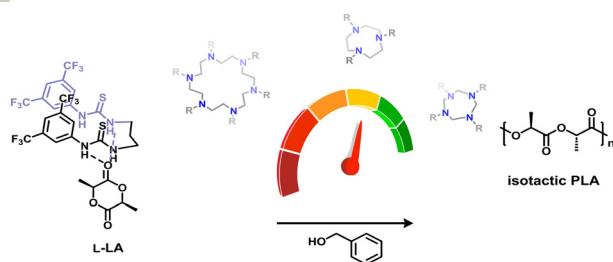
**Effect of metal loading sequences in  $CO_2$  methanation activity on samarium-doped ceria supported bimetallic catalysts**

Andrew C. Chien\* and Corinna C. Chi



## PAPERS

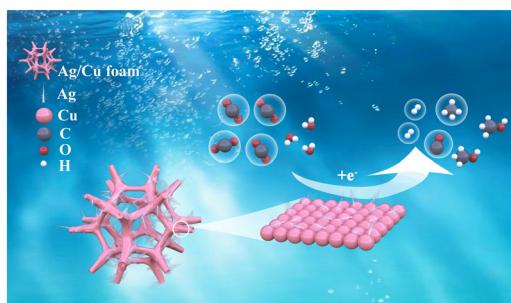
71



## Bis-thiourea and macrocyclic polyamines as binary organocatalysts for the ROP of lactide

Assunta D'Amato, Maria Voccia, Filippo Bruno, Sara D'Aniello, Lucia Caporaso,\* Francesco De Riccardis, Irene Izzo, Giorgio Della Sala\* and Mina Mazzeo\*

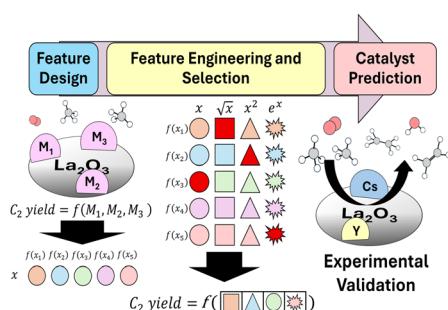
81



## Ag/Cu foam catalyst for selective reduction of $\text{CO}_2$ to $\text{CH}_3\text{OH}$ at low potential

Ruitao Nie, Xiaolong Deng, Haoyu Yang, Hongwei Chen, Jie Yang, Meiyi Lu, Keqi Peng, Xiaoyu Zhou, Chen Yang, Juan Xie\* and Hu Wang\*

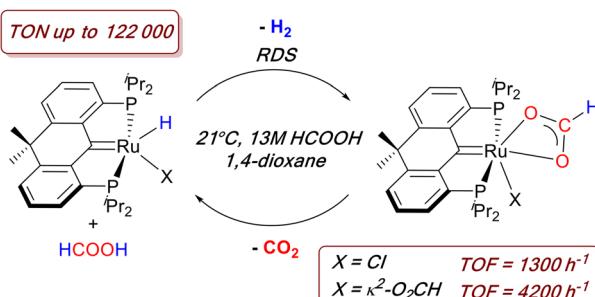
92



## Design of low temperature $\text{La}_2\text{O}_3$ oxidative coupling of methane catalysts using feature engineering and automated sampling

Fernando Garcia-Escobar,\* Lauren Takahashi, Ali Shaaban, Shun Nishimura and Keisuke Takahashi\*

100



## Rapid and selective formic acid dehydrogenation catalysis by molecular ruthenium hydrides supported by rigid PC<sub>carbene</sub>P pincer ligands

Laurie J. Donnelly, Benjamin S. Gelfand and Warren E. Piers\*

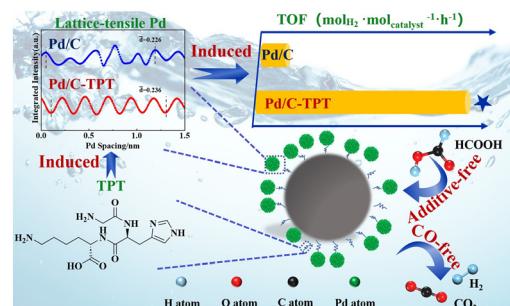


## PAPERS

107

**Exploiting tripeptide in Pd/C for boosting hydrogen production from formic acid dehydrogenation**

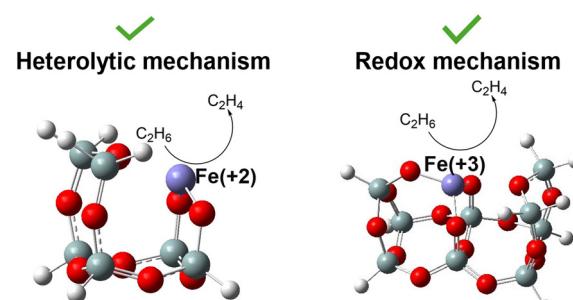
Yan Gu, Hongli Wang,\* Yaohao Zhang, Lu Yang, Xiaoshan Liu and Xuesong Li\*



114

**On the mechanisms of ethane dehydrogenation on silica-supported mononuclear Fe**

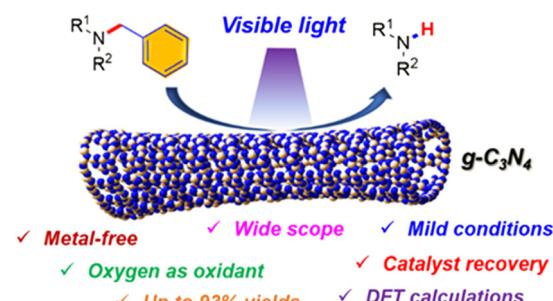
Sakshi Satyanand, Sanjana Srinivas, Dionisios G. Vlachos\* and Stavros Caratzoulas



123

**Green photocatalytic *N*-debenzylation with molecular oxygen catalyzed by recyclable metal-free tubular carbon nitride**

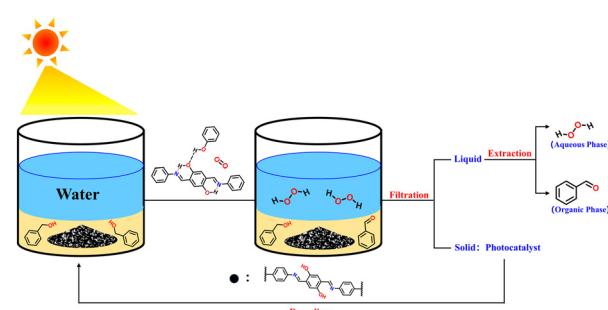
Yufeng Wu,\* Jiajie Kang, Jianing Li, Mingshu Bi and Qingwei Meng



135

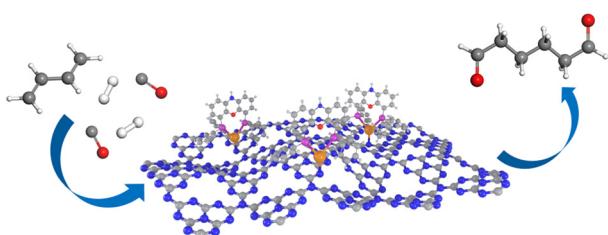
**Phenol hydroxyl-modified imine-based covalent organic frameworks for enhanced solar-driven generation of H2O2 via hydrogen bonds**

Lang Chen, Song Qin, Jiahui Hang, Bo Chen, Jinyang Kang, Yang Zhao, Shanyong Chen, Yongdong Jin, Hongjian Yan, Yuanhua Wang\* and Chuanqin Xia\*



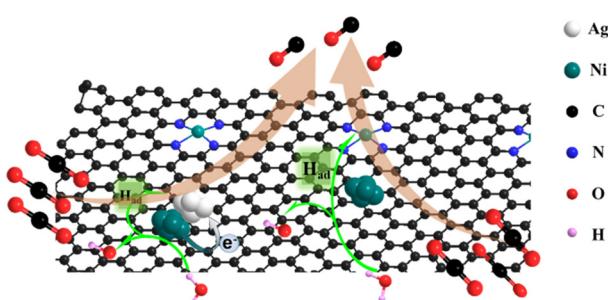
## PAPERS

145


**Investigation on heterogeneous Rh catalysts for the hydroformylation of 1,3-butadiene to adipic aldehyde**

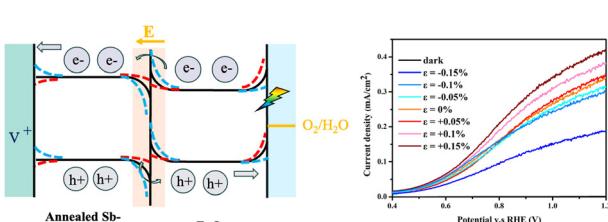
Lijin Gan, Zekun Liu, Lei Feng, Yi Duan, Guangyuan Xu, Si Chen and Huan Yan\*

154


**Alignment of active sites on Ag–Ni catalysts for highly selective  $\text{CO}_2$  reduction to CO**

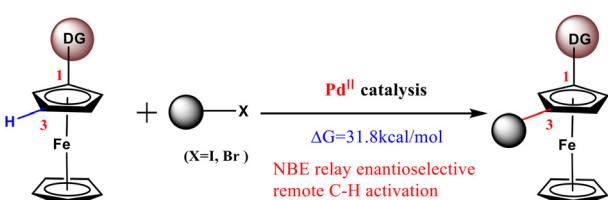
Huangdong Wang, Zhihua Guo, Heng Zhang, Lin Jia, Min Sun, Lifeng Han, Haorun Li, Yan Guo\* and Shanghong Zeng\*

165


**Enhancing the photoelectrochemical water splitting efficiency of ZnO P–N homojunction nanorod arrays under the piezocatalyst effect**

Yi-Miao Lin, Yu-Liang Hsiao, Chia-Shing Wu, Ying-Chih Pu and Chuan-Pu Liu\*

173


**Mechanistic insights into an enantioselective synthetic strategy for 1,3-disubstituted planar chiral ferrocenes**

Feiyun Jia,\* Chenghua Zhang, Yongsheng Yang, Xueting Zheng and Mingsong Shi\*

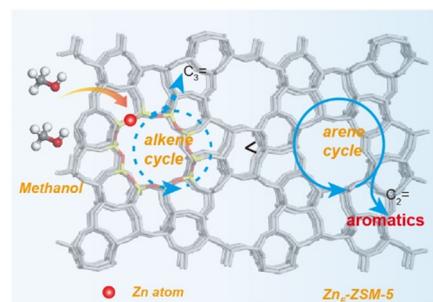


## PAPERS

185

**The catalytic relevance of hydrothermally substituted Zn on the zeolite ZSM-5 during the methanol-to-aromatics process**

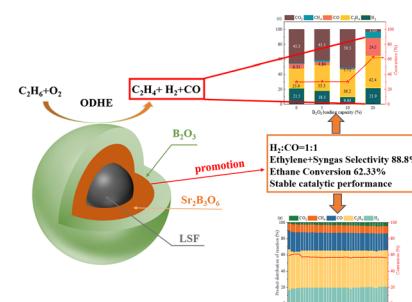
Xin Zhang, Xinyu You, Yunfan Wang, Hexun Zhou, Xue Zhou and Abhishek Dutta Chowdhury\*



193

**$\text{B}_2\text{O}_3$  supported  $\text{La}_{0.8}\text{Sr}_{0.2}\text{FeO}_3$  for direct ethane oxidation into ethylene and syngas for hydroformylation synthesis**

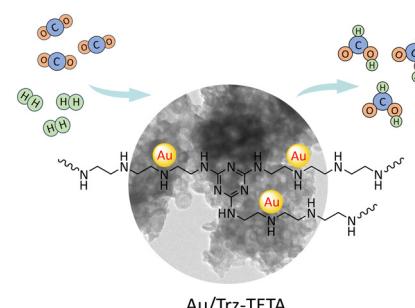
Shan Hu, Yunfei Gao,\* Lu Ding, Xueli Chen, Weitong Pan and Fuchen Wang



203

**Modulating the electronic interaction between Au and nitrogen-rich porous organic polymers for enhanced  $\text{CO}_2$  hydrogenation to formic acid**

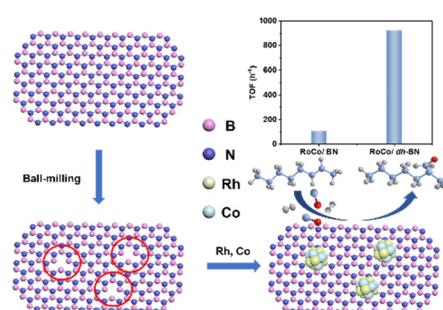
Huixin Yan, Xingyan Wang, Xiaoyu Liang, Xinxin Zhang, LongFei Liu, Min Ji, Min Wang\* and Xinkui Wang\*



211

**Heterogeneous hydroformylation of internal alkenes over a defect-laden hexagonal BN supported RhCo alloy: reaction performance modulated by N vacancies**

Bowen Qiu, Shujuan Liu, Shimin Liu, Xinjiang Cui, Dongcheng He, Kang Zhao, Bin Wang and Feng Shi\*



## CORRECTION

219

**Correction: Integrated adsorption and photocatalytic degradation of VOCs using a TiO<sub>2</sub>/diatomite composite: effects of relative humidity and reaction atmosphere**

Guangxin Zhang,\* Arman Peyravi, Zaher Hashisho,\* Zhiming Sun,\* Yangyu Liu, Shuilin Zheng and Lexuan Zhong

