

# Catalysis Science & Technology

A multidisciplinary journal focussing on all fundamental science and technological aspects of catalysis

[rsc.li/catalysis](https://rsc.li/catalysis)

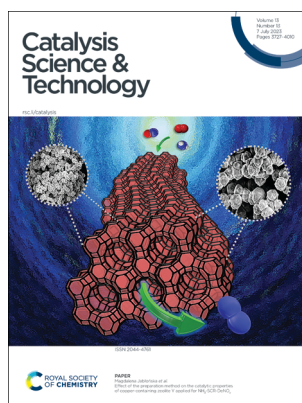
The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

## IN THIS ISSUE

ISSN 2044-4761 CODEN CSTAGD 13(13) 3727–4010 (2023)



**Cover**  
See Zhijian Tian *et al.*,  
pp. 3796–3803.  
Image reproduced by  
permission of Zhijian Tian  
from *Catal. Sci. Technol.*,  
2023, 13, 3796.



**Inside cover**  
See Magdalena Jabłońska *et al.*,  
pp. 3804–3817.  
Image reproduced by permission  
of Magdalena Jabłońska  
from *Catal. Sci. Technol.*,  
2023, 13, 3804.

## EDITORIAL

3737

### Introduction to Plastic Conversion

Ina Vollmer,\* Haritz Sardon, George W. Huber  
and Zhibo Li

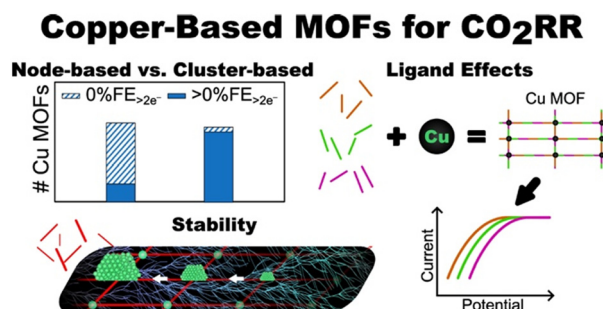


## PERSPECTIVE

3740

### Copper-based metal–organic frameworks for CO<sub>2</sub> reduction: selectivity trends, design paradigms, and perspectives

Ugochukwu Nwosu and Samira Siahrostami\*



## Editorial Staff

### Executive Editor

Maria Southall

### Deputy Editor

Bianca Provost

### Editorial Production Manager

Emily Skinner

### Assistant Editors

Sean Browner, Molly Colgate, Paul Scott, Alison Winder

### Editorial Assistant

Basita Javeed

### Publishing Assistant

Allison Holloway

### Publisher

Sam Keltie

For queries about submitted articles please contact

Emily Skinner, Editorial Production Manager, in the first instance.

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

For pre-submission queries please contact

Maria Southall, Executive Editor.

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

Catalysis Science & Technology electronic: ISSN 2044-4761

is published 24 times a 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: £2552; US\$4214.

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)

# Catalysis Science & Technology

A multidisciplinary journal focusing on all fundamental science and technological aspects of catalysis

[rsc.li/catalysis](http://rsc.li/catalysis)

## Editorial Board

### Editor-in-Chief

Bert Weckhuysen,

Utrecht University, The Netherlands

### Associate Editors

Dirk De Vos, KU Leuven, Belgium

Shaojun Guo, Peking University, China

Mélanie Hall, University of Graz, Austria

Bin Liu, Nanyang Technological University, Singapore

Núria López, Institut Català d'Investigació Química, Spain

Will Medlin, University of Colorado Boulder, USA

Regina Palkovits, RWTH Aachen, Germany

Xiulian Pan, Chinese Academy of Sciences, China

Kenichi Shimizu, Hokkaido University, Japan

Andrew Weller, University of York, UK

Chris Williams, University of South Carolina, USA

Yong Zhou, Nanjing University, China

## Advisory Board

Isabel Arends, Utrecht University, The Netherlands

Xinhe Bao, Dalian Institute of Chemical Physics, CAS, China

Bhachandra Bhanage, Institute of Chemical Technology, Mumbai, India

George Britovsek, Imperial College London, UK

Christian Bruneau, Institut des Sciences Chimiques de Rennes, France

Yong Cao, Fudan University, China

Matt Clarke, University of St Andrews, UK

Christophe Coperet, ETH Zürich, Switzerland

Avelino Corma, Valencia University, Spain

Johannes de Vries, Leibniz-Institut für Katalyse, Germany

Chris Hardacre, University of Manchester, UK

Graham Hutchings, University of Cardiff, UK

David Jackson, University of Glasgow, UK

Axel Knop-Gericke, Fritz-Haber Institute of the Max Planck Society, Germany

Can Li, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

Wei-Xue Li, University of Science and Technology of China, China

Antonio Llobet, Institut Català d'Investigació Química, Spain

Jennifer Love, University of Calgary, Canada

Ding Ma, Peking University, China

Debabrata Maiti, IIT Bombay, India

Noritaka Mizuno, University of Tokyo, Japan

Francesca Paradisi, University of Bern, Switzerland

Evgeny Pidko, Delft University of Technology, The Netherlands

Robert M. Rioux, The Pennsylvania State University, USA

Tito Scaiano, University of Ottawa, Canada

Tetsuya Shishido, Tokyo Metropolitan University, Japan

Tsunehiro Tanaka, Kyoto University, Japan

Nick Turner, University of Manchester, UK

Piet van Leeuwen, University of Toulouse, France

Ning Yan, National University of Singapore, Singapore

Jinhua Ye, National Institute for Materials Science, Japan

## Information for Authors

Full details on how to submit material for publication in Catalysis Science & Technology 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/catalysis](http://rsc.li/catalysis)

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

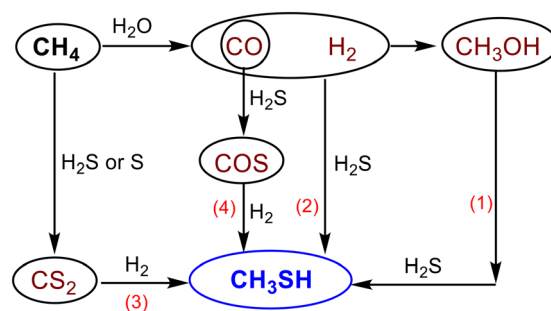


## MINI REVIEW

3762

## Methyl mercaptan production – catalysts and processes

Abdelilah Bayout, Claudia Cammarano,  
Izabel Medeiros Costa, Gleb Veryasov and Vasile Hulea\*

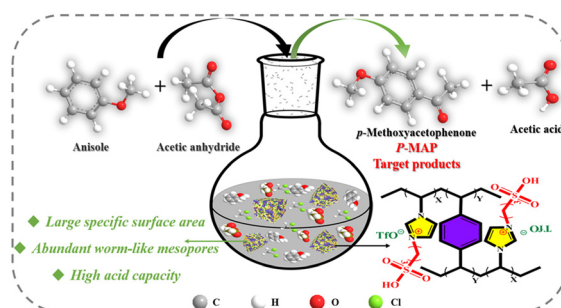


## COMMUNICATIONS

3779

## An efficient porous acidic ionic liquid polymer catalyst for Friedel–Crafts acylation reactions

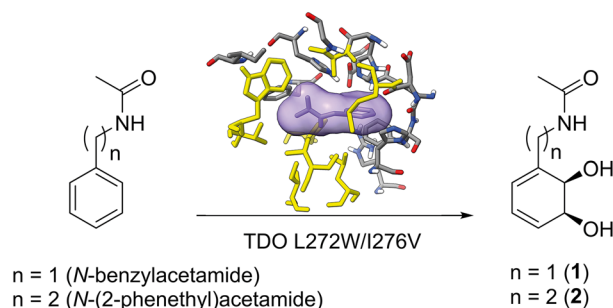
Junhu Zhao, Ming Li, Peng Yang, Xiangyang Jiang,  
Zhaojin Lv, Pier-Luc Tremblay\* and Tian Zhang\*



3784

## Production of novel Rieske dioxygenase metabolites enabled by enzyme engineering

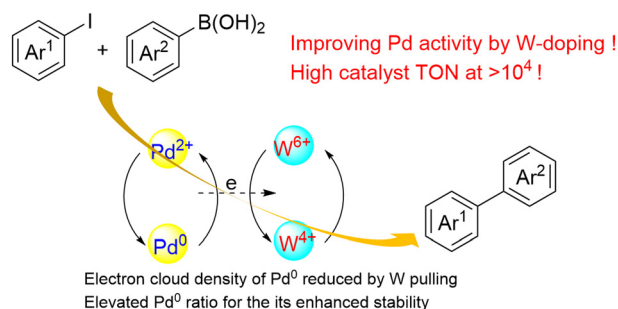
Elizabeth A. Osifalujo, Bailey N. Rutkowski,  
Louis R. Satterwhite, Phillip C. Betts, Angel K. Nkosi  
and Jordan T. Froese\*



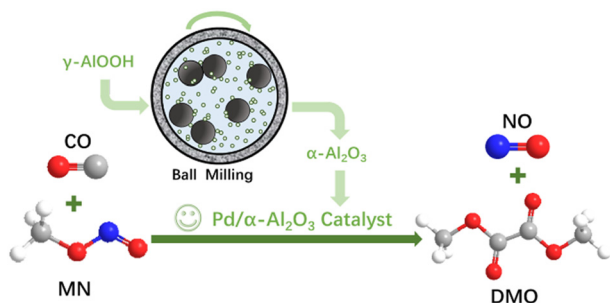
3791

## Tungsten-doping promoted catalytic activity of polyaniline-supported palladium for the Suzuki–Miyaura coupling reaction

Yiyang Zhang,\* Hong Sun, Yonghuai Yang, Haoifei Li,  
Yaocheng Shi and Lei Yu\*



3796

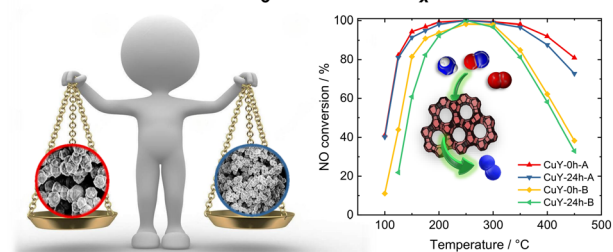


### Mechanochemical synthesis of a high-surface-area $\text{Pd}/\alpha\text{-Al}_2\text{O}_3$ catalyst for CO oxidative coupling to dimethyl oxalate reaction

Lin Yang, Zhendong Pan, Donge Wang, Shuaiqi Wang, Xiaoping Wang, Huaijun Ma, Wei Qu and Zhijian Tian\*

3804

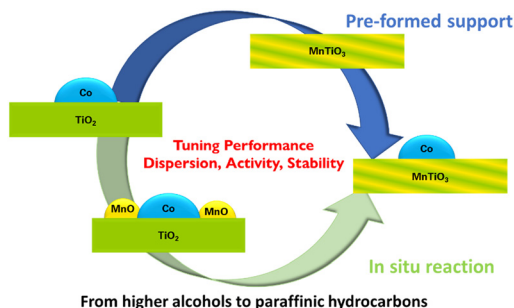
### $\text{NH}_3\text{-SCR-DeNO}_x$



### Effect of the preparation method on the catalytic properties of copper-containing zeolite Y applied for $\text{NH}_3\text{-SCR-DeNO}_x$

Rujito S. R. Suharbiansah, Muhammad Fernadi Lukman, Chiara Nannuzzi, Anna Wach, Kinga Góra-Marek, Michael Liebau, Ana Palčić, Andreas Pöpl, Gloria Berlier, Silvia Bordiga, Roger Gläser and Magdalena Jabłońska\*

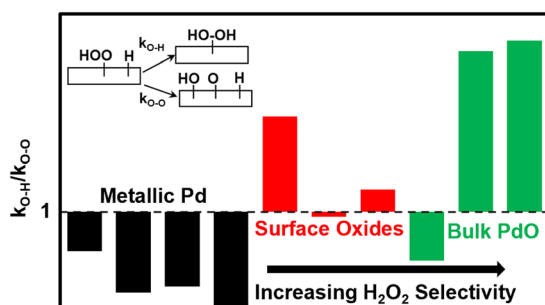
3818



### Controlling cobalt Fischer-Tropsch stability and selectivity through manganese titanate formation

James Paterson,\* David Brown, Sarah J. Haigh, Philip Landon, Qizhen Li, Matthew Lindley, Mark Peacock, Hendrik van Rensburg and Zhuoran Xu

3828



### Theoretical assessments of Pd-PdO phase transformation and its impacts on $\text{H}_2\text{O}_2$ synthesis and decomposition pathways

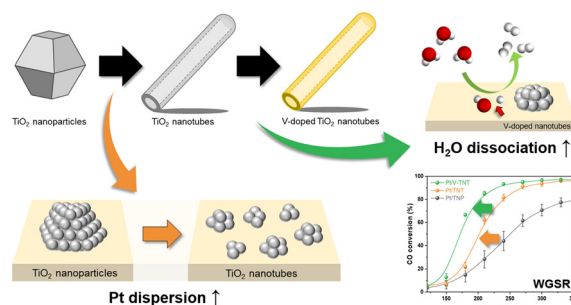
Manasi Vyas, Fernando Fajardo-Rojas, Diego A. Gómez-Gualdrón and Stephanie Kwon\*



3849

### Nanotubular Pt-loaded $\text{TiO}_2$ catalysts with vanadium-doping to enhance water–gas shift reaction activity

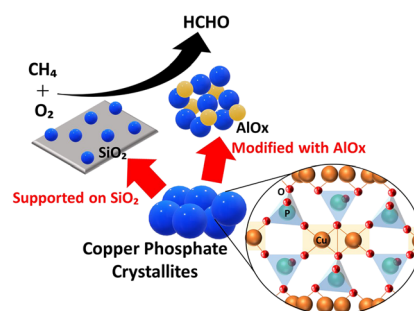
Jihyeon Song, Myeong Gon Jang, Kyung-Jong Noh, Yunkyung Kim and Jeong Woo Han\*



3859

### Active and durable copper phosphate catalysts modified with metal oxides for methane oxidation with oxygen into formaldehyde

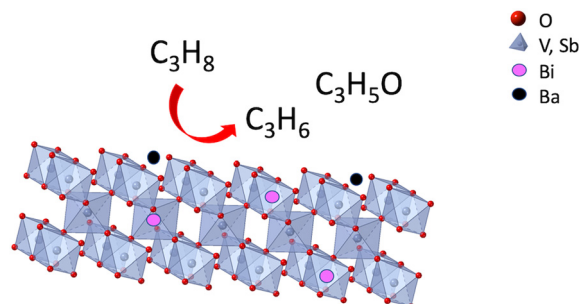
Mana Shimakawa and Sakae Takenaka\*



3867

### Dissecting the role of Bi and Ba in the catalytic efficiency of $\text{VSbBiBa}/\text{Al}_2\text{O}_3$ catalysts in oxidative dehydrogenation and oxidation of propane

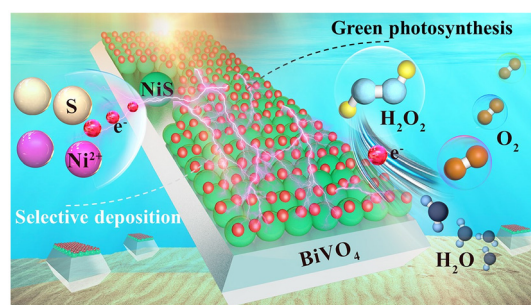
A. Bouzeggane, P. P. Bargiela, M. Aouine, R. Checa, I. Popescu, I. C. Marcu, O. Peruch, V. Bellière-Baca and J. M. M. Millet\*



3884

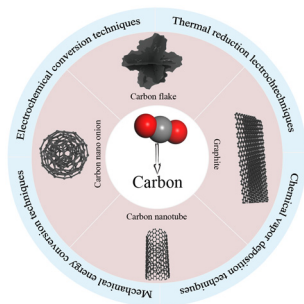
### Accurate modulation of NiS cocatalysts on the photoelectron transfer sites of $\text{BiVO}_4$ for photocatalytic $\text{H}_2\text{O}_2$ generation

Haiyang Shi, Shuaikang Li, Min Wang, Xinyu Yin, Junxian Huang, Wenjing Qi, Xuefei Wang,\* Ping Wang, Feng Chen and Huogen Yu\*





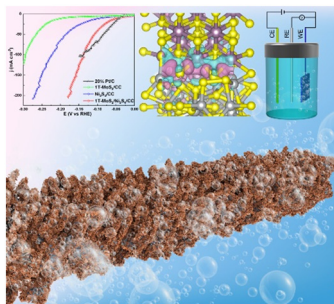
3891



### Conversion of carbon dioxide into solid carbon materials – a mini review

Xinlei Cheng, Minxian Wu,\* Jun Li, Wenchang Wang, Naotoshi Mitsuzaki and Zhidong Chen\*

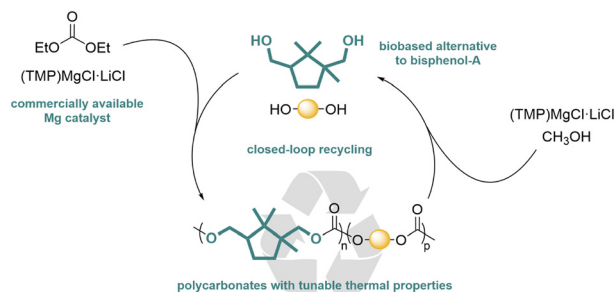
3901



### Constructing a 1T-MoS<sub>2</sub>/Ni<sub>3</sub>S<sub>4</sub> heterostructure to balance water dissociation and hydroxyl desorption for efficient hydrogen evolution

Lijuan Xiang, Xilin Liu, Shaonan Xu, Kaiwen Wang, Shisheng Yuan and Nan Li\*

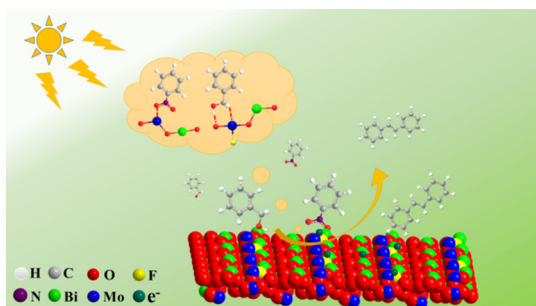
3910



### Efficient synthesis of camphor-based polycarbonates: a direct route to recyclable polymers

Bo Jiang and Christophe M. Thomas\*

3916



### Photocatalytic one-pot alkylation of nitrobenzene with benzyl alcohol for the precise synthesis of *N*-benzylideneaniline over F-doped Bi<sub>2</sub>MoO<sub>6</sub> nanosheets

Guangcheng Zou, Rui Cao, Conghui Cui, Yuqiang Luo, Chen Huang, Xinwei Cui, Zhiwen Wang and Yujie Song\*

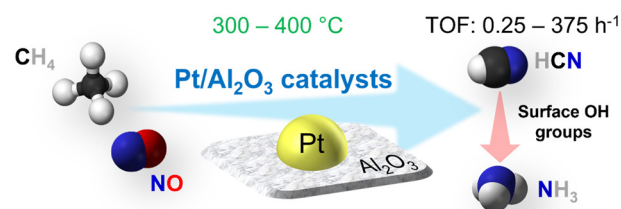


## PAPERS

3927

### Methane activation with nitric oxide at low temperatures on supported Pt catalysts: effects of the support

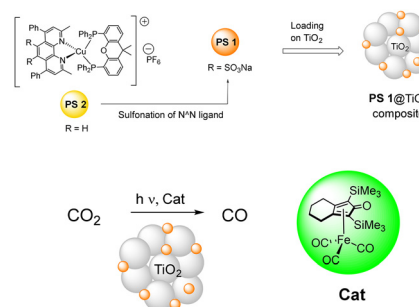
Nobuya Suganuma, I. Tyrone Ghampson, Hiroki Miura, Junichi Murakami, Kyoko K. Bando, Tetsuya Kodaira, Tatsuya Yamasaki, Atsushi Takagaki, Tatsumi Ishihara and Tetsuya Shishido\*



3940

### Photocatalytic CO<sub>2</sub> reduction with a TiO<sub>2</sub>-supported copper photosensitizer and an iron-based CO<sub>2</sub> reduction catalyst

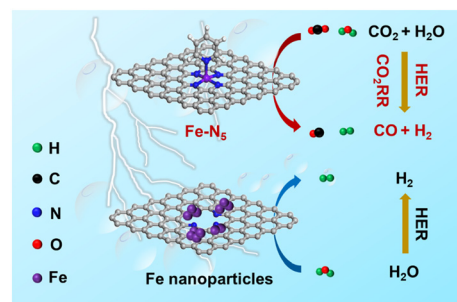
H. D. Huerta-Zerón, N. Rockstroh, M. Lang, A.-E. Surkus, V. Brüser, S. Lochbrunner, H. Junge\* and M. Beller\*



3946

### Fabricating penta-coordinated Fe single atoms for electrochemical CO<sub>2</sub> reduction to syngas

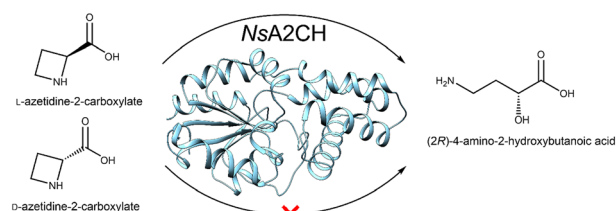
Linjie Wang, Xiaofei Lai, Yafeng Xu, Shaojuan Luo,\* Lu Wang,\* Kai Yan, Da Zhang, Sitong Feng and Yong Xu\*



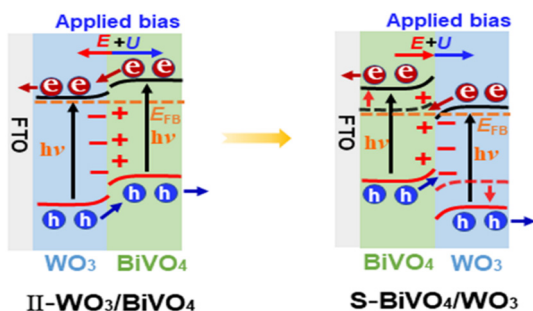
3953

### Enzymatic hydrolysis of L-azetidine-2-carboxylate ring opening

Xuexia Xu,\* Qin Yang, Lanteng Wang, Jie Zheng, Yang Gu, Xiwen Xing\* and Jiahai Zhou\*



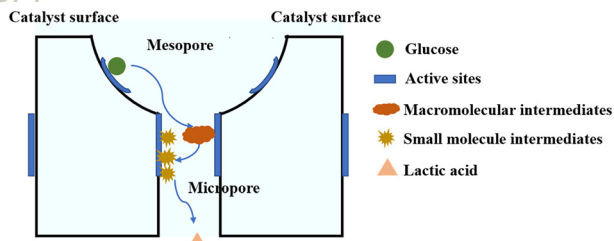
3963



### Interfacial electric field of BiVO<sub>4</sub>/WO<sub>3</sub> photoanode-induced S-scheme charge transfer for enhanced photoelectrochemical performance

Jian Zuo, Huili Guo, Shu Chen,\* Yong Pei\* and Canjun Liu

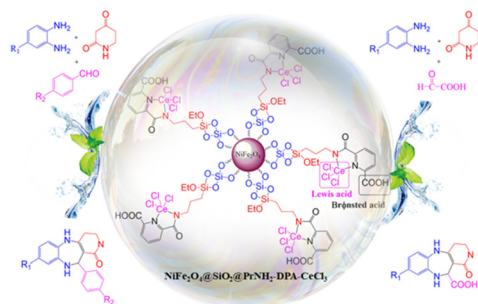
3974



### Synergistic effects of bimetals and hierarchical structures in Mg–Sn–Beta-H zeolites for lactic acid synthesis from biomass-derived carbohydrates

Meng Xia, Zheng Shen,\* Shaoze Xiao, Minyan Gu and Yalei Zhang\*

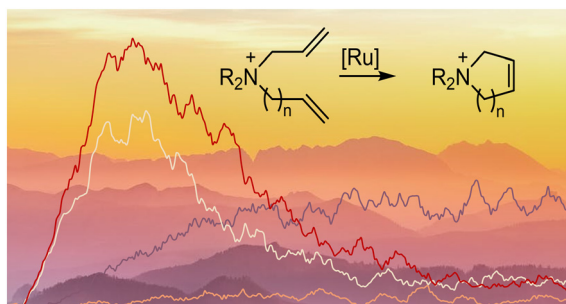
3987



### NiFe<sub>2</sub>O<sub>4</sub>@SiO<sub>2</sub>@PrNH<sub>2</sub>-DPA-CeCl<sub>3</sub>: a cerium-based magnetic nano dual-acid catalyst with high efficacy and recyclability for domino sequential synthesis of lactam ring-fused 1,5-benzodiazepines

Xiao Zhang, Fan Bai, Miaomiao Li, Huihui Ru and Lanzhi Wang\*

4000



### Competitive isomerization and catalyst decomposition during ring-closing metathesis

Charles Killeen, Jie Liu, Harmen S. Zijlstra, Florian Maass, James Piers, Reid Adams, Allen Oliver and J. Scott McIndoe\*

