

Industrial Chemistry & Materials

An international journal of significant innovative research and major technological breakthroughs in all aspects of industrial chemistry and materials

rsc.li/icm

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 2755-2500 CODEN ICMNCZ 1(2) 149–272 (2023)



Cover

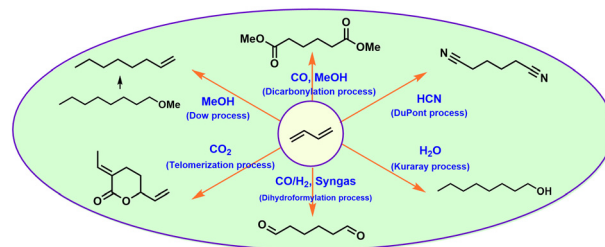
See Ji Yang,
Matthias Beller *et al.*,
pp. 155–174.
Image reproduced by
permission of Matthias Beller
from *Ind. Chem. Mater.*,
2023, 1, 155.

MINI REVIEWS

155

Industrially applied and relevant transformations of 1,3-butadiene using homogeneous catalysts

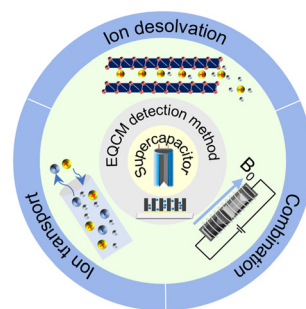
Ji Yang,* Peng Wang, Helfried Neumann, Ralf Jackstell and Matthias Beller*



175

Understanding the charging of supercapacitors by electrochemical quartz crystal microbalance

Liang Niu, Long Yang, Jingjing Yang, Ming Chen, Liang Zeng, Pan Duan, Taizheng Wu, Emmanuel Pаметé, Volker Presser and Guang Feng*



Editorial Staff

Managing Editor
Jing Kong

Assistant Editors
Huixian Dong, Xitong Wang
Content Development Editor
Nancy Qin

Editorial Production Manager
Sarah Whitbread

Regional Publisher
Guanqun Song

Publisher
Neil Hammond

Journals Launch Manager
Kathryn Gempf

For queries about submitted papers, please contact
Sarah Whitbread Editorial Production Manager, in the first instance.
E-mail: icmprod@rsc.org

For pre-submission queries, please contact
Jing Kong, Managing Editor
Email: icm@rsc.org

ICM (Print ISSN 2755-2608; Online ISSN 2755-2500)
is published 4 times a year by the Royal Society of Chemistry,
Thomas Graham House, Science Park, Milton Road, Cambridge,
CB4 0WF, UK.

ICM is a Gold Open Access journal and all articles
are free to read

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

For marketing opportunities relating to this journal,
contact marketing@rsc.org

Industrial Chemistry & Materials

rsc.li/icm

Industrial Chemistry & Materials (ICM) publishes significant innovative research and major technological breakthroughs in all aspects of industrial chemistry and materials, with a particular focus on the important innovation of low-carbon chemical industry, energy and functional materials.

Editor-in-Chief

Suojiang Zhang, Institute of Process Engineering, CAS, China

Associate Editor

Maohong Fan, University of Wyoming, USA
Chao Lu, Zhengzhou University/Beijing
University of Chemical Technology, China
Anja V. Mudring, Aarhus University, Denmark

Rong Sun, Shenzhen Institute of Advanced
Electronic Materials, CAS, China
Quanhong Yang, Tianjin University, China
Shouliang Yi, National Energy Technology
Laboratory, USA

Tierui Zhang, Technical Institute of Physics and
Chemistry, CAS, China
Xiangping Zhang, Institute of Process
Engineering, CAS, China

Advisory board

Matthias Beller, LIKAT Rostock, Germany
Xianhe Bu, Nankai University, China
Yu Fang, Shaanxi Normal University, China
Jerzy Leszczynski, Jackson State University,
USA

Qilong Ren, Zhejiang University, China
Blake A. Simmons, Lawrence Berkeley National
Laboratory, USA
Chunming Xu, China University of Petroleum,
China

Donghui Zhang, Dalian Institute of Chemical
Physics, CAS, China

Editorial board members

Santiago Aparicio, University of Burgos, Spain
Hongbin Cao, Institute of Process Engineering,
CAS, China
George Zheng Chen, University of Nottingham,
UK
Liwei Chen, Shanghai Jiao Tong University,
China
Walid Daoud, City University of Hong Kong,
China
Shoubhik Das, University of Antwerp, Belgium
Xianfeng Fan, University of Edinburgh, UK
Mara G. Freire, University of Aveiro, Portugal
Feng Gao, Linköping University, Sweden
Yanlong Gu, Huazhong University of Science
and Technology, China
Ruilan Guo, University of Notre Dame, USA
Yu Han, King Abdullah University of Science and
Technology, Saudi Arabia
Niklas Hedin, Stockholm University, Sweden
Peter Hesemann, University of Montpellier,
France
John D. Holbrey, Queen's University Belfast, UK
Xu Hou, Xiamen University, China
Yongsheng Hu, Institute of Physics, CAS, China
Anker Degn Jensen, Technical University of
Denmark, Denmark

Xiaoyan Ji, Lulea University of Technology,
Sweden
Arjan W. Kleij, Institute of Chemical Research of
Catalonia, Spain
Changzhi Li, Zhejiang University, China
Xianfeng Li, Dalian Institute of Chemical Physics,
CAS, China
Yingwei Li, South China University of
Technology, China
Di-Jia Liu, Argonne National Laboratory, USA
Jianmei Lu, Soochow University, China
Xiang Ma, East China University of Science and
Technology, China
Anton Middelberg, The University of Adelaide,
Australia
Kotohiro Nomura, Tokyo Metropolitan
University, Japan
Lijia Pan, Nanjing University, China
Srikanth Pilla, Clemson University, USA
Albert Poater, University of Girona, Spain
Jieshan Qiu, Beijing University of Chemical
Technology, China
Mark B. Shiflett, University of Kansas, USA
Weiqun Shi, Institute of High Energy Physics,
CAS, China
Seema Singh, Joint BioEnergy Institute, USA

Zhi Sun, Institute of Process Engineering, CAS,
China
Atsushi Urakawa, Delft University of
Technology, Netherlands
Xiangjian Wan, Nankai University, China
Guoxia Wang, University of Technology Sydney,
Australia
Jianguo Wang, Zhejiang University of
Technology, China
Yapei Wang, Renmin University of China, China
Yuen Wu, University of Science and Technology
of China, China
Qun Xu, Zhengzhou University, China
Yijun Xu, Fuzhou University, China
Feng Yan, Soochow University, China
Chunxia Zhao, The University of Adelaide,
Australia
Huijun Zhao, Griffith University, Australia
Haitao Zhang, Institute of Process Engineering,
CAS, China
Xin Zhang, Institute of Process Engineering,
CAS, China
Ying Zhang, University of Science and
Technology of China, China
Gengfeng Zheng, Fudan University, China
Ying Zheng, Western University, Canada

Information for Authors

Full details on how to submit material for publication in ICM are given
in the Instructions for Authors (available from <https://www.rsc.org/journals-books-databases/about-journals/>

industrial-chemistry-materials). Submissions should be made via the
journal's homepage: rsc.li/icm

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 owned by the © Institute of Process Engineering,
Chinese Academy of Sciences, China 2022.

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.
The paper used in this publication meets the requirements of ANSI/
NISO Z39.48–1992
(Permanence of Paper).
Registered charity number: 207890

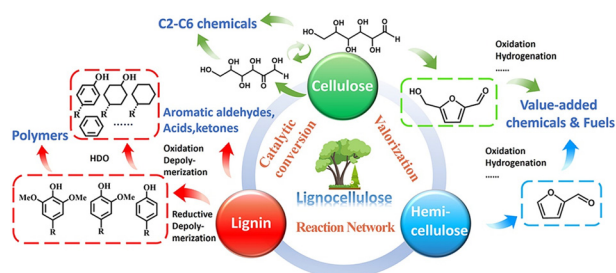


REVIEWS

188

Catalytic conversion network for lignocellulosic biomass valorization: a panoramic view

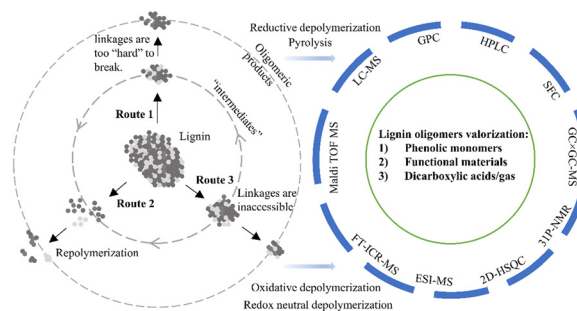
Shenyu Wang, Aohua Cheng, Fanhua Liu, Junjie Zhang, Tao Xia, Xiang Zeng, Wei Fan* and Ying Zhang*



207

Perspective on oligomeric products from lignin depolymerization: their generation, identification, and further valorization

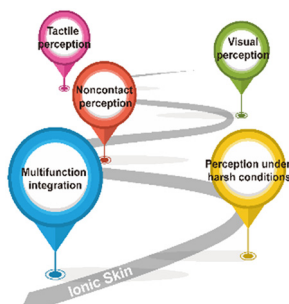
Yinglei Han, Blake A. Simmons and Seema Singh*



224

Ionic skin: from imitating natural skin to beyond

Zhiwu Chen and Yapei Wang*

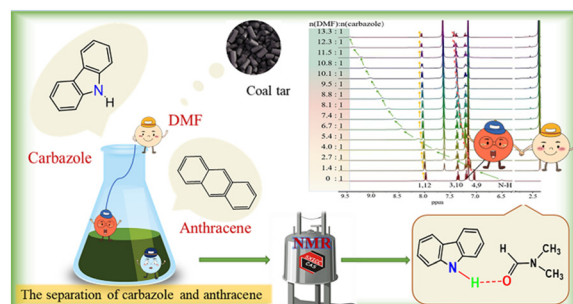


PAPERS

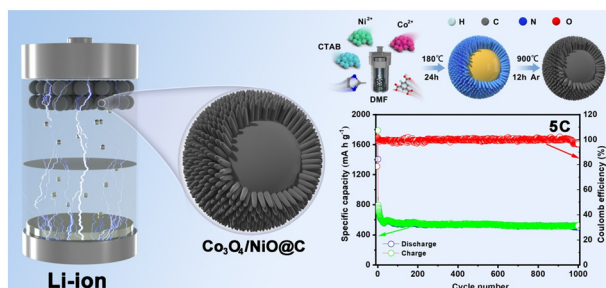
240

Understanding the interaction mechanism of carbazole/anthracene with *N,N*-dimethylformamide: NMR study substantiated carbazole separation

Hui Cao, Mengyu Dou, Zexiang Lyu, Yingxiong Wang, Christian Marcus Pedersen and Yan Qiao*



247



Preparation of yolk-shell urchin-like porous $\text{Co}_3\text{O}_4/\text{NiO}@\text{C}$ microspheres with excellent lithium storage performance

Linhe Yu, Qihao Yang, Guozhen Zhu* and Renchao Che*

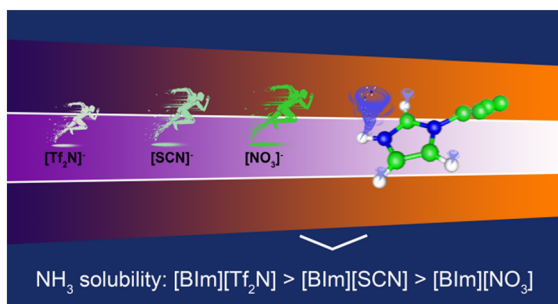
254



Large-scale direct regeneration of $\text{LiFePO}_4@\text{C}$ based on spray drying

Yongxing Zou, Jinwei Cao, Hao Li, Wanbao Wu, Yihong Liang and Jiaheng Zhang*

262



Theoretical insights into NH_3 absorption mechanisms with imidazolium-based protic ionic liquids

Wenhui Tu, Shaojuan Zeng,* Ying Bai, Xiaochun Zhang, Haifeng Dong and Xiangping Zhang*

