

Chem Soc Rev

Chemical Society Reviews

rsc.li/chem-soc-rev

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 0306-0012 CODEN CSRVBR 52(24) 8449-8722 (2023)



Cover

See Menachem Elimelech *et al.*, pp. 8455–8480. Image reproduced by permission of Menachem Elimelech from *Chem. Soc. Rev.*, 2023, 52, 8455. Artwork by Ella Maru Studio.



Inside cover

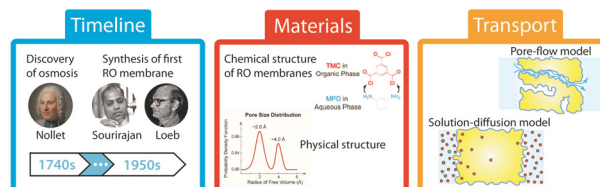
See Lingxin Chen, Sang-Woo Joo, Jaebum Choo *et al.*, pp. 8500–8530. Image reproduced by permission of Jaebum Choo from *Chem. Soc. Rev.*, 2023, 52, 8500.

TUTORIAL REVIEWS

8455

Mechanisms and models for water transport in reverse osmosis membranes: history, critical assessment, and recent developments

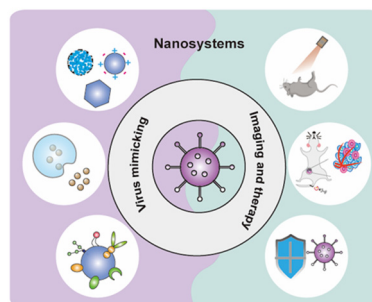
Mohammad Heiranian, Hanqing Fan, Li Wang, Xinglin Lu and Menachem Elimelech*



8481

Virus-mimicking nanosystems: from design to biomedical applications

Hao-Yang Liu, Xiao Li, Zhi-Gang Wang and Shu-Lin Liu*



Editorial Staff

Executive Editor

Richard Kelly

Deputy Editor

Harriet Riley

Editorial Production Manager

Helen Saxton

Development Editors

Danny Andrews, Ershad Abubacker

Senior Publishing Editor

Becky Webb

Publishing Editors

Kirstine Anderson, Matthew Bown, Laura Cooper, Hannah Fielding, Anoushka Handa, Claire Harding, Alan Holder, Charlie Palmer, Rosie Rothwell, Donna Smith, Laura Smith

Editorial Assistant

Jade Holliday

Publishing Assistant

Natalie Ford

Publisher

Jeanne Andres

For queries about submitted papers, please contact Helen Saxton, Editorial Production Manager, in the first instance. E-mail: chemsocrev@rsc.org

For pre-submission queries, please contact Richard Kelly, Executive Editor.

E-mail: chemsocrev-rsc@rsc.org

Chemical Society Reviews (print: ISSN 0306-0012; electronic: ISSN 1460-4744) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

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

2023 Annual (electronic) subscription price: £1,259; US\$1997. 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

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

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

Chem Soc Rev

Chemical Society Reviews

rsc.li/chem-soc-rev

Chemical Society Reviews publishes accessible, succinct and reader-friendly articles on topics of current interest in the chemical sciences. The promotion of international and multidisciplinary awareness and cooperation is particularly encouraged. Chemical Society Reviews publishes three article types: tutorial reviews, which present an accessible introduction to the topic; review articles, which provide a deeper evaluation of the current literature; and Viewpoints, which are short, opinion-based articles

Editorial Board

Chair

Jennifer Love, University of Calgary

Associate Editors

Xian-He Bu, Nankai University of China
Louise Berben, University of California Davis
Vy Dong, University of California, Irvine
Rebecca Goss, University of St Andrews
Giulia Grancini, University of Pavia
Zhong-Qun Tian, Xiamen University

Members

Osamu Ishitani, Tokyo Institute of Technology
Raghaven Sunoj, IIT Bombay
Tatjana Parac-Vogt, KU Leuven

Advisory Board

Ryu Abe, Kyoto University
Dave Adams, University of Glasgow
David Amabilino, Institute of Materials Science of Barcelona
Ruchi Anand, IIT Bombay
Ivan Arahamian, Dartmouth College
Parisa A. Ariya, McGill University
Tom Baker, University of Ottawa
Thomas Bennett, University of Cambridge
Gonçalo Bernardes, Cambridge University
Barry Blight, New Brunswick
Anne-Marie Caminade, University of Toulouse
Araceli Campaña, University of Granada
Rui Cao, Shaanxi Normal University
Hong Chen, Soochow University
Yong Cui, Shanghai Jiao Tong University
Abhishek Dey, IACS
Huw Davies, Emory University
Wim Dehaen, Catholic University of Leuven
William Dichtel, Northwestern University
Yves Dufrene, Université catholique de Louvain
Antonio Echavarren, Institute of Chemical Research of Catalonia
Elena Fernández, Universitat Rovira i Virgili
Miriam Freedman, Pennsylvania State University
Philip A. Gale, The University of Sydney
Debashree Ghosh, IACS
Duncan Graham, University of Strathclyde
Stefan Grimme, Universität Bonn
Frances Houlé, Joint Centre for Artificial Photosynthesis
Ashlee Howarth, Concordia University
Feihe Huang, Zhejiang University
Masako Kato, Kwansei Gakuin University
Jong Seung Kim, Korea University
Rafal Klajn, Weizmann Institute of Science

Daniele Leonori, RWTH Aachen University
Chao-Jun Li, McGill University
Jinghong Li, Tsinghua University
Yan Li, Peking University
Zhuang Liu, Peking University
Norberto Pepporino Lopes, CEMMO
Bettina Lotsch, Max Planck Institute for Solid State Research
Connie Lu, University of Minnesota
Cara Lubner, NREL
Rafael Luque, King Saud University, Saudi Arabia
Uday Maitra, Indian Institute of Science
Nazario Martin, Complutense University of Madrid
Feliu Maseras, Institute of Chemical Research of Catalonia
Fiona Meldrum, University of Leeds
Gugu Mhlongo, CSIR
Simona Mura, Institut Galien Paris-Saclay
Brenno Neto, Brasília
Tebello Nyokong, Rhodes University
Martin Oestreich, Technische Universität Berlin
Elisa Orth, Federal University of Paraná
Mario Pagliaro, National Research Council (CNR)
Atul Parikh, University of California Davis
Kanyi Pu, Nanyang Technological University
Eric Rivard, University of Alberta
Gregory Robinson, University of Georgia
Peter Roesky, Karlsruhe Institute of Technology
Ashley Ross, University of Cincinnati
Vincent Rotello, University of Massachusetts
Joanna Sadler, University of Edinburgh

Paolo Samori, University of Strasbourg
D D Sarmá, IISc
Clément Sanchez, Pierre and Marie Curie University
Hélder A. Santos, University of Helsinki
Jennifer Schaefer, Notre Dame
Wendy Shaw, PNNL
Injae Shin, Yonsei University
David Spring, University of Cambridge
Andrew Steckl, University of Cincinnati
Samuel Stupp, Northwestern University
Jin Suntivich, Cornell
Kana Sureshan, IISER Thiruvananthapuram
Michael Tam, University of Waterloo
Andrea Trabocchi, University of Florence
James Tucker, University of Birmingham
Leyong Wang, Nanjing University
Peng Wang, Changchun Institute of Applied Chemistry
Bert Weckhuysen, Utrecht University
Helma Wennemers, ETH Zurich
Stephen Withers, University of British Columbia
Yujie Xiong, University of Science and Technology of China
Makoto Yamashita, Nagoya University
Juyoung Yoon, Ewha Womans University
Shuli You, Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences
Guihua Yu, University of Texas at Austin
Claudio Zannoni, University of Bologna
Haoli Zhang, Lanzhou University
Qiang Zhang, Tsinghua University
Yong Zhang, NUS
Yiping Zhao, University of Georgia
Hongli Zhu, Northeastern University

Information for Authors

Full details on how to submit material for publication in Chem Soc Rev 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/chem-soc-rev

The Editorial board typically commission articles that encourage international, interdisciplinary progress in chemical research. The board welcomes proposals for new tutorial reviews or review articles. Please contact the Editorial office for further details (chemsocrev-rsc@rsc.org). Additional details are available from the Editorial office or <http://www.rsc.org/authors>

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.

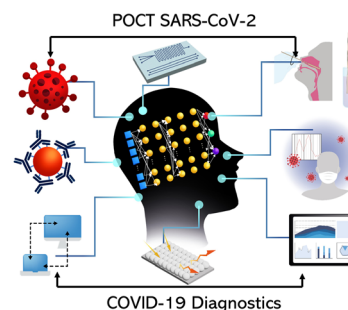
Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, 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.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

Registered charity number: 207890

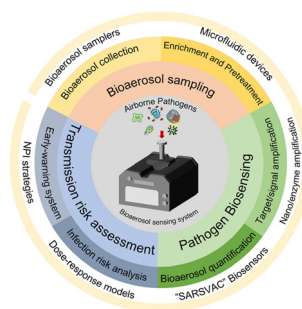


Sungwoon Lee, Liyan Bi, Hao Chen, Dong Lin,
Rongchao Mei, Yixuan Wu, Lingxin Chen,*
Sang-Woo Joo* and Jaebum Choo*



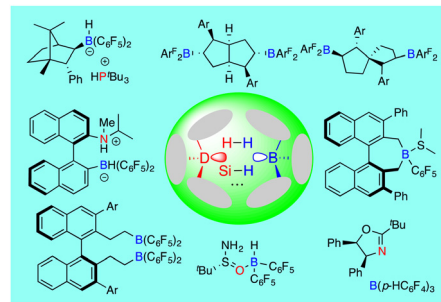
8531

Guangyu Qiu,* Xiaole Zhang, Andrew J. deMello,*
Maosheng Yao, Junji Cao and Jing Wang*



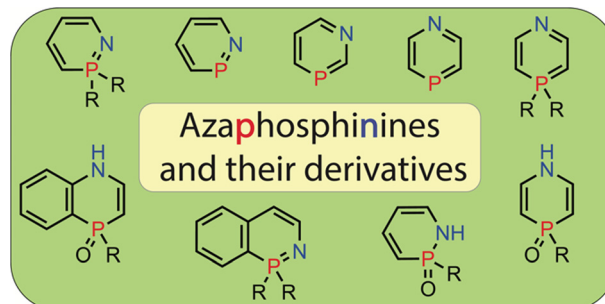
8580

Xiangqing Feng, Wei Meng and Haifeng Du*



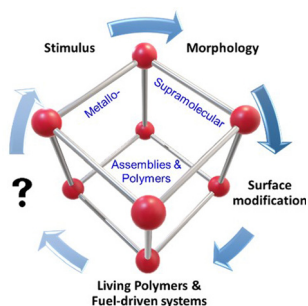
8599

J. Nolan McNeill, Jeremy P. Bard,* Darren W. Johnson*
and Michael M. Haley*



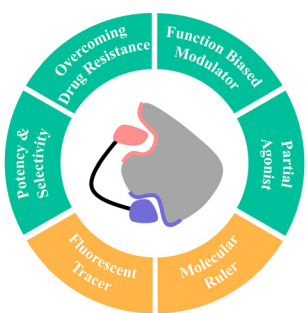
REVIEW ARTICLES

8635

**Metallosupramolecular polymers: current status and future prospects**

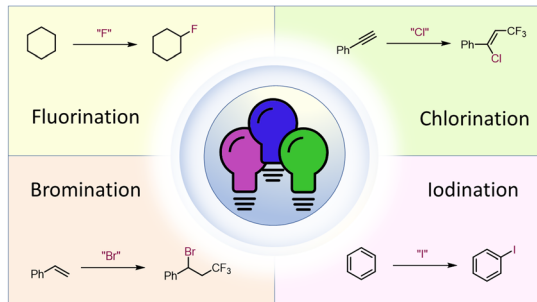
Rahul Dev Mukhopadhyay and Ayyappanpillai Ajayaghosh*

8651

**Designing drugs and chemical probes with the dualsteric approach**

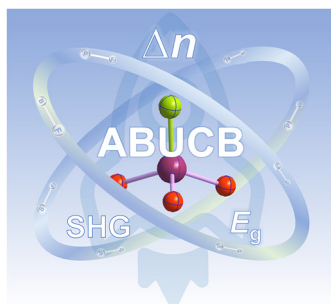
Jinyin Zha, Jixiao He, Chengwei Wu, Mingyang Zhang, Xinyi Liu and Jian Zhang*

8678

**Visible light-mediated halogenation of organic compounds**

Alexey A. Festa, Olga A. Storozhenko, Leonid G. Voskressensky and Erik V. Van der Eycken*

8699

**Anisotropic structure building unit involving diverse chemical bonds: a new opportunity for high-performance second-order NLO materials**

Xin Liu, Yi-Chang Yang, Meng-Yue Li, Ling Chen* and Li-Ming Wu*

