# Journal of Materials Chemistry B

Materials for biology and medicine

# rsc.li/materials-b

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 2050-750X CODEN JMCBDV 11(19) 4145-4368 (2023)



#### Cover

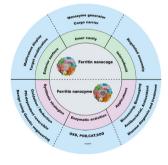
See Jiaqi Lin, Ning Chen, Xueguang Lu et al., pp. 4171-4180. Image reproduced by permission of Xuequang Lu from J. Mater. Chem. B, 2023, 11, 4171.

#### **REVIEW**

4153

# Ferritin nanocages: a versatile platform for nanozyme design

Chunyu Wang, Qiqi Liu, Xinglu Huang\* and Jie Zhuang\*

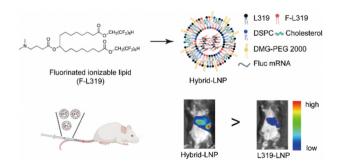


## **PAPERS**

4171

# A fluorinated ionizable lipid improves the mRNA delivery efficiency of lipid nanoparticles

Haonan Huo, Xingdi Cheng, Jiaxi Xu, Jiaqi Lin,\* Ning Chen\* and Xueguang Lu\*



#### **Editorial Staff**

**Executive Editor** 

Michaela Mühlberg

**Deputy Editor** 

Geraldine Hav

**Editorial Production Manager** 

Ionathon Watson

Senior Publishing Editor

Fiona Iddon

**Development Editor** 

**Publishing Editors** 

Eleanor Griffiths, Francesca Jacklin, Brian Li

Editorial Assistant

Daniel Smith

Publishing Assistant

Iane Paterson

Publisher

Sam Keltie

For queries about submitted papers, please contact Ionathon Watson, Editorial Production Manager in the first instance. E-mail: materialsB@rsc.org

For pre-submission queries please contact Michaela Mühlberg, Executive Editor.

E-mail: materialsB-rsc@rsc.org

Journal of Materials Chemistry B (electronic: ISSN 2050-7518) is published

48 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: £2192; \$3516. 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

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

# Journal of Materials Chemistry B

#### rsc.li/materials-b

Journal of Materials Chemistry A, B & C cover high quality studies across all fields of materials chemistry. The journals focus on those theoretical or experimental studies that report new understanding, applications, properties and synthesis of materials, Journal of Materials Chemistry B covers materials with applications in biology and medicine.

#### **Editorial Board**

#### Editor-in-Chief

Jeroen Cornelissen, University of Twente, The Netherlands

#### **Associate Editors**

Jiang Chang, Shanghai Institute of Ceramics, China Elizabeth Cosgriff-Hernandez, The

University of Texas at Austin, USA Gemma-Louise Davies, University College London, UK

Jian Ji, Zhejiang University, China Shaoqin Liu, Harbin Institute of Technology,

Yoshiko Miura, Kyushu University, Japan Marc in het Panhuis, University of

Wollongong, Australia Jessica Winter, The Ohio State University,

#### Member

Claus Feldmann, Karlsruhe Institute of Technology, Germany

#### Advisory Board

D. Benoit, University of Rochester, USA W. Chan, University of Notifester, USA W. Chan, University of Toronto, Canada K. Chatterjee, Indian Institute of Science,

H. Cölfen, University of Konstanz, Germany T. Da Ros, Trieste University, Italy

T. Davis, Monash University, Australia T. Desai, University of California, San

X. Deng, Peking University, China

E. Duguet, University of Bordeaux, France C. Fan, Shanghai Jiao Tong University, China

Y. Fang, NCNST, China R. Forgan, University of Glasgow, UK J. Fu, Ningbo Institute of Industrial Technology, Chinese Academy of Sciences,

A. Gedanken, Bar-Ilan University, Israel M. Grunlan, Texas A&M University, USA Y. Gun'ko, Trinity College Dublin, Ireland J. van Hest, Radboud University Nijmegen,

The Netherlands K. Hamad-Schifferli, University of Massachusetts Boston, USA B. Harley, University of Illinois, USA A. Higuchi, National Central University, Chinese Taipei, and Wenzhou Medical University, China S. Inal, KAUST, Saudia Arabia

Y. Ito, RIKEN, Japan B. Keselowsky, University of Florida, USA

J. Khandare, MIT WPU Campus, India A. Kloxin, University of Delaware, USA N. Kotov, University of Michigan, USA

Z.-C. Li, Peking University, China E. Lipke, Auburn University, USA L. Liz-Marzan, CIC biomaGUNE, Spain

D. Lynn, University of Wisconsin, USA E. D.-L. Ma, Hong Kong Baptist University, Hong Kong

G. Malliaras, University of Cambridge, UK H.-Q. Mao, Johns Hopkins University, USA S. Marchesan, University of Triest , Italy D. Martin, University of Delaware, USA K. Masters, University of Wisconsin-Madison,

A. Miserez, Nanyang Technological

University, Singapore R. O'Reilly, University of Birmingham, UK A. Pannier, University of Nebraska, USA I. Park, KAIST, Korea

S. Perrier, University of Warwick, UK X. Qu, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences,

M. Resmini, Queen Mary University of

London, UK K. Schenke-Layland, NMI Natural and Medical Sciences Institute, University of Tübingen, Reutlingen, Germany C. Schmidt, University of Florida, USA

L. Segatori, Rice University, USA

T. Serizawa, Tokyo Institute of Technology, Iapan

Y. Shen, Zhejiang University, China S. Staniland, University of Sheffield, UK N. Steinmetz, University of California, San

Diego, USA M. Stenzel, University of New South Wales, Australia

M. Stevens, Imperial College London, UK S. Stoll, Georgetown Washington, USA L. Suggs, University of Texas at Austin, USA M. Takai, University of Tokyo, Japan J. Temenoff, Georgia Institute of Technology,

P. Théato, Karlsruhe Institute of Technology,

Germany R. Ulijn, City University of New York, US J. Zheng, University of Akron, USA

# Information for Authors

Full details on how to submit material for publication in Journal of Materials Chemistry B 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/materials-b. Submissions: The journal welcomes submissions of manuscripts for publication as Full Papers, Communications, Reviews, Highlights and as run rapets, communated ones, nevews, running as and Applications. Full Papers and Communications should describe original work of high quality and impact which must highlight the novel properties or applications (or potential properties/applications) of the materials studied.

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.

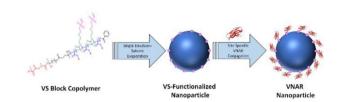
Registered charity number: 207890



#### 4181

# Functionalization of polymeric nanoparticles with targeting VNAR ligands using vinyl sulfone conjugation

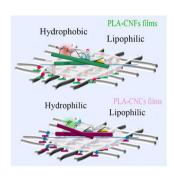
Adam Leach, Marie Finnegan, Mariana S. Machado, Laura Ferguson, John Steven, Peter Smyth, Andrew Porter, Caroline Barelle, Efrosyni Themistou\* and Christopher J. Scott\*



#### 4191

Preparation of nanocellulose by a biological method from hemp stalk in contrast to the chemical method and its application on the electrospun composite film

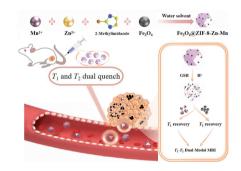
Xin Zhang, Jing Guo,\* Yuanfa Liu,\* Xinmin Hao, Qiang Yao, Yi Xu and Yafei Guo



# 4203

Tumor microenvironment responsive  $T_1 - T_2$ dual-mode contrast agent Fe<sub>3</sub>O<sub>4</sub>@ZIF-8-Zn-Mn NPs for in vivo magnetic resonance imaging

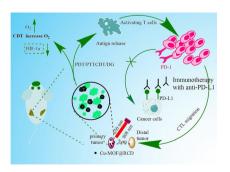
Minmin Liang, Weixiu Zhou, Haifeng Zhang, Jutian Zheng, Jiaomin Lin,\* Lu An and Shiping Yang\*



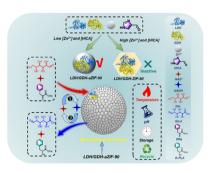
#### 4211

A carbon dot-doped Cu-MOF-based smart nanoplatform for enhanced immune checkpoint blockade therapy and synergistic multimodal cancer therapy

Zhongping Su, Haiying Xu, Ying Zhang, Huanli Zhang, Hui Zhang, Yujun Bao, Xiaodan Wu, Rui Yan, Guanghui Tan,\* Zhiqiang Wang\* and Yingxue Jin\*



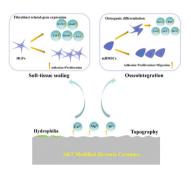
4227



A two-enzyme system in an amorphous metal-organic framework for the synthesis of **D-phenyllactic acid** 

Yifeng Wang, Xiaolong Sun, Jiahuan Hu, Qing Guo, Ping Zhang, Xi Luo,\* Baoxing Shen\* and Yongqian Fu\*

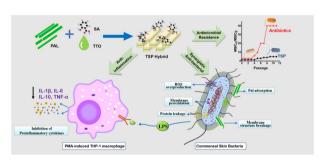
4237



Improving the osseointegration and soft tissue sealing of zirconia ceramics by the incorporation of akermanite via sol infiltration for dental implants

Wenmin Zhang, Wenhao Fu, Xiaolan Wang\* and Jiandong Ye\*

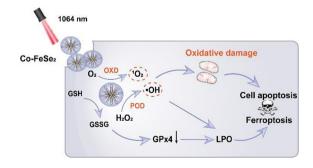
4260



Construction of tea tree oil/salicylic acid/ palygorskite hybrids for advanced antibacterial and anti-inflammatory performance

Xi Zhang, Lihua Cao, Huiyu Li, Ziyi Xiong, Zhengpeng Fu, Zhaolun Zhang, Wenjing Xie, Hongyan Cui, Shuang Zhang, Ying Tang\* and Yongjun Feng\*

4274



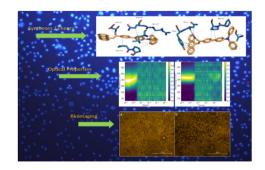
Dual enzyme-like Co-FeSe<sub>2</sub> nanoflowers with GSH degradation capability for NIR II-enhanced catalytic tumor therapy

Jingge Zhang, Enna Ha,\* Danyang Li, Shuqing He, Luyang Wang, Shaolong Kuang and Junqing Hu\*

#### 4287

# Exploring the potential of anthracene derivatives as fluorescence emitters for biomedical applications

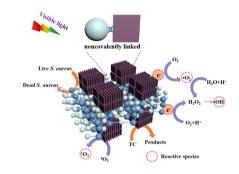
Murat Aydemir,\* Gulcin Haykir, Harun Selvitopi, Ozge Caglar Yildirim, Mehmet Enes Arslan, Bahattin Abay and Figen Turksoy\*



## 4296

Self-assembled A-D-A type indacenodithiophenebased small conjugated molecule/TiO2 for enhancing the photocatalytic activity

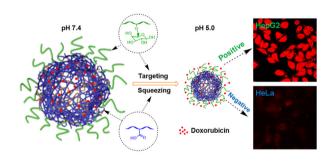
Enwei Zhu, Tingyu Yang, Juan Du, Chunbo Liu,\* Chunhong Ma\* and Haiyong Guo\*



## 4308

Sub-50 nm core-shell nanoparticles with the pH-responsive squeezing release effect for targeting therapy of hepatocellular carcinoma

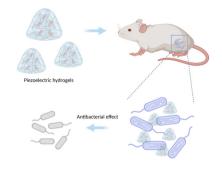
Jian-Bo Qu,\* Huan-Jie Che, Bo Gao, Gang-Feng Li, Xue-Fei Zhang, Yi-Bo Zhang and Xiaojuan Wang\*



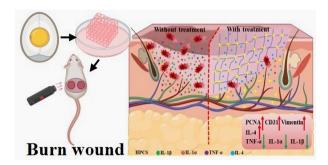
#### 4318

Engineering ultrasound-activated piezoelectric hydrogels with antibacterial activity to promote wound healing

Min Xu, Shaozhen Wu, Li Ding, Caijiao Lu, Huangjing Qian, Jinmiao Qu\* and Yu Chen\*



4330



Facile synthesis of hydroxypropyl chitosan-egg white hydrogel dressing with antibacterial and antioxidative activities for accelerating the healing of burn wounds

Ying Zhao, Yulan Zhao, Yuguo Chu and Qiang Chang\*

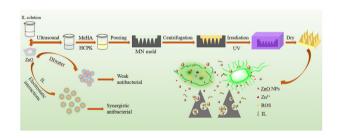
4346



A tumor-targetable probe based on europium(III)/ gadolinium(III) complex-conjugated transferrin for dual-modal time-gated luminescence and magnetic resonance imaging of cancerous cells in vitro and in vivo

Bo Song,\* Jiao Jiang, Huinan Yan, Shengjun Huang and Jingli Yuan\*

4354



Dissolving microneedles based on ZnO nanoparticles and an ionic liquid as synergistic antibacterial agents

Xiaodan Li, Wenzhen Du, Wenxin Xu, Guixia Ling\* and Peng Zhang\*

# CORRECTION

4365

Correction: Bio-related applications of porous organic frameworks (POFs)

He Zhang, Guoliang Li, Chunyang Liao,\* Yaqi Cai and Guibin Jiang