

Biomaterials Science

An international high impact journal exploring the underlying science behind the function, interactions and design of biomaterials

rsc.li/biomaterials-science

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

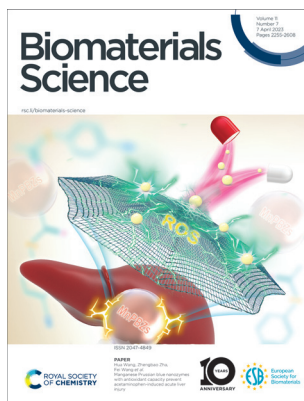
ISSN 2047-4849 CODEN BSICCH 11(7) 2255–2608 (2023)



Cover

See Sabina Quader, Rosalía Rodríguez-Rodríguez *et al.*, pp. 2336–2347.

Image reproduced by permission of Sebastian Zagmutt from *Biomater. Sci.*, 2023, **11**, 2336.



Inside cover

See Hua Wang, Zhengbao Zha, Fei Wang *et al.*, pp. 2348–2358.

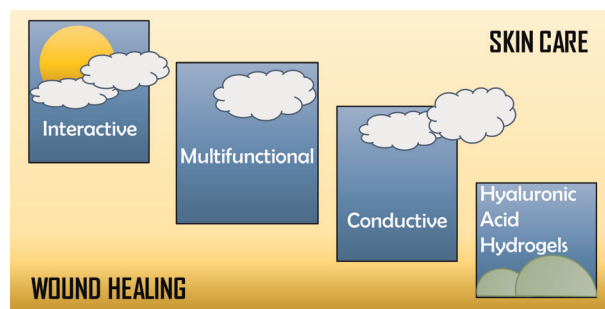
Image reproduced by permission of Zhengbao Zha from *Biomater. Sci.*, 2023, **11**, 2348.

MINIREVIEW

2266

Multifunctional conductive hyaluronic acid hydrogels for wound care and skin regeneration

Víctor Castrejón-Comas, Carlos Alemán* and Maria M. Pérez-Madrigal*

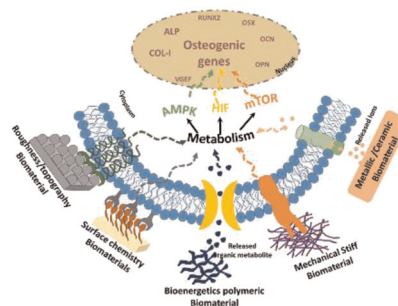


REVIEWS

2277

Cellular metabolism: a link connecting cellular behaviour with the physiochemical properties of biomaterials for bone tissue engineering

Shivani Chaudhary, Doyel Ghosal, Pravesh Tripathi and Sachin Kumar*



Editorial Staff

Executive Editor

Maria Southall

Deputy Editor

Laura Ghandhi

Editorial Production Manager

Cara Sutton

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 papers, please contact
Cara Sutton, Editorial Production Manager in the first instance.
E-mail: biomaterialsscience@rsc.org

For pre-submission queries please contact
Maria Southall, Executive Editor.
E-mail: biomaterialsscience-rsc@rsc.org

Biomaterials Science (electronic: ISSN 2047-4849) 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: £2450, \$4518.
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

Biomaterials Science

rsc.li/biomaterials-science

An international high impact journal exploring the science of biomaterials
and their translation towards clinical use.

Editorial Board

Editor-in-chief

Jianjun Cheng, Westlake University, China

Associate Editors

Khuloud Al-Jamal, King's College London, UK
Nasim Annabi, University of California, Los
Angeles, USA

Lino Ferreira, UC-Biotech, Portugal

Jöns Hilborn, Uppsala University, Sweden

Won Jong Kim, POSTECH, Korea

Shyni Varghese, Duke University, USA

Fu-Jian Xu, Beijing University of Chemical
Technology, China

Can Zhang, China Pharmaceutical University,

China

Xinyuan Zhu, Shanghai Jiao Tong University, China

Editorial Board Members

Pamela Habibovic, Maastricht University,
Netherlands

Advisory Board

Lihi Adler-Abramovich, Tel Aviv University, Israel

Kazunari Akiyoshi, iCeMS, Japan

Cameron Alexander, University of Nottingham, UK

Edmondo Benetti, ETH Zürich, Switzerland

Mark Bradley, University of Edinburgh, UK

Jayanta Chatterjee, IISc, India

Arabinda Chaudhuri, CSIR-Indian Institute of

Chemical Technology, India

Guoping Chen, National Institute for Materials

Science (NIMS), Japan

Yiyun Cheng, East China Normal University, China

Joel Collier, Duke University, USA

Justin Cooper-White, University of Queensland,

Australia

Honggang Cui, Johns Hopkins University, USA

Jianwu Dai, Institute of Genetics and

Developmental Biology of CAS, China

Cole DeForest, University of Washington, USA

Andrew Dove, University of Birmingham, UK

Yizhou Dong, The Ohio State University, USA

Hongwei Duan, Nanyang Technological University

(NTU), Singapore

Christine Dufes, University of Strathclyde, UK

Nicholas Dunne, Dublin City University, Ireland

Jennifer Elisseeff, Johns Hopkins University, USA

Elisabeth Engel Lopez, IBEc, Spain

Shaoqin Sarah Gong, University of Wisconsin-

Madison, USA

Dong Keun Han, Cha University, Korea

Ngan Huang, Stanford, USA

Chris Jewell, University of Maryland, USA

Jian Ji, Zhejiang University, China

Ali Khademhosseini, Terasaki Institute for

Biomedical Innovation, USA

April Kloxin, University of Delaware, USA

Veena Koul, IIT Delhi, India

Christine Le Maitre, Sheffield Hallam University, UK

Haeshin Lee, KAIST, Republic of Korea

Khoon Lim, University of Sydney, Australia

Matthias Lutolf, Ecole Polytechnique Fédérale de

Lausanne, Switzerland

Atsushi Maruyama, Tokyo Institute of Technology,

Japan

Phillip Messersmith, University of California,

Berkeley, USA

Aline Miller, University of Manchester, UK

Hyejung Mok, Konkuk University, Korea

Steve Oh, A*STAR, Singapore

Shaunak Pandya, Prolong Pharmaceuticals, USA

Ling Peng, Aix-Marseille University, France

Nicholas Peppas, University of Texas at Austin, USA

Catherine Picart, Grenoble INP, France

Tilo Pompe, University of Leipzig, Germany

Suzie Pun, University of Washington, USA

Shun Shen, Tongji University, China

Heungsoo Shin, Hanyang University, Korea

Molly Shoichet, University of Toronto, Canada

Xintao Shuai, Sun Yat-Sen University, China

Aasheesh Srivastava, IISER, India

Patrick Stayton, University of Washington, USA

Marcus Textor, ETH Zurich, Switzerland

Takafumi Ueno, Tokyo Institute of Technology,

Japan

Jun Wang, South China University of Technology,

China

Tanja Weil, Max Planck Institute for Polymer

Research, Germany

Stephanie Willerth, University of Victoria, Canada

Zimei Wu, University of Auckland, New Zealand

Evelyn Yin, Waterloo, Canada

Information for Authors

Full details on how to submit material for publication in Biomaterials Science
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/biomaterials-science. Submissions:

The journal welcomes submissions of manuscripts for publication as
Full Papers, Communications, Minireviews and Reviews. Full Papers and
Communications should describe original work of high quality and impact.

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

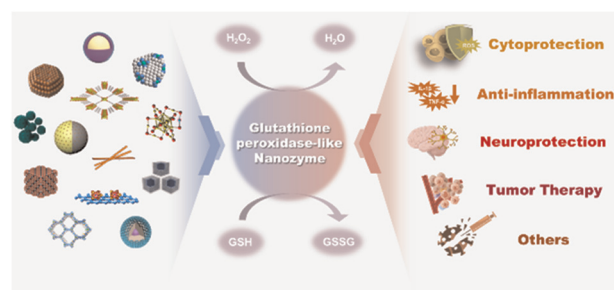


REVIEWS

2292

Glutathione peroxidase-like nanozymes: mechanism, classification, and bioapplication

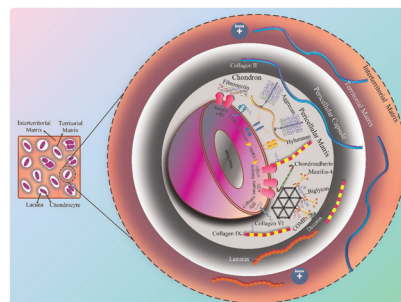
Yifan Lai, Jingyu Wang, Ning Yue, Qiaochu Zhang, Jiangjiexing Wu,* Wei Qi and Rongxin Su*



2317

Post-decellularized printing of cartilage extracellular matrix: distinction between biomaterial ink and bioink

Kiana Mokhtarinia and Elahe Masaeli*



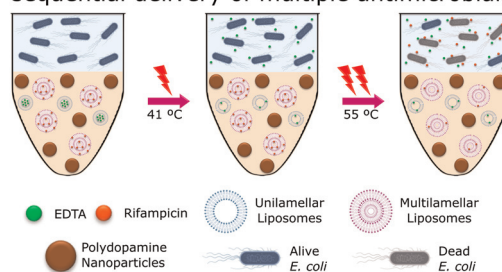
COMMUNICATION

2330

Laser-responsive sequential delivery of multiple antimicrobials using nanocomposite hydrogels

Meera Patel, Alexander L. Corbett, Aarushi Vardhan, Keuna Jeon, Nesha May O. Andoy and Ruby May A. Sullan*

sequential delivery of multiple antimicrobials

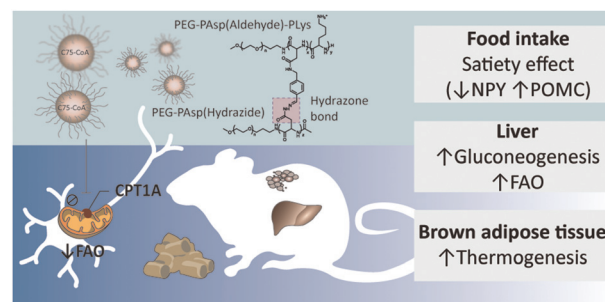


PAPERS

2336

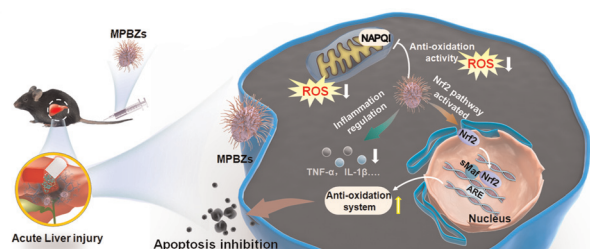
Nanomedicine targeting brain lipid metabolism as a feasible approach for controlling the energy balance

Jesús García-Chica, West Kristian Dizon Paraiso, Sebastián Zagmutt, Anna Fosch, Ana Cristina Reguera, Sara Alzina, Laura Sánchez-García, Shigeto Fukushima, Kazuko Toh, Núria Casals, Dolors Serra, Laura Herrero, Jordi Garcia, Kazunori Kataoka, Xavier Ariza, Sabina Quader* and Rosalia Rodríguez-Rodríguez*



PAPERS

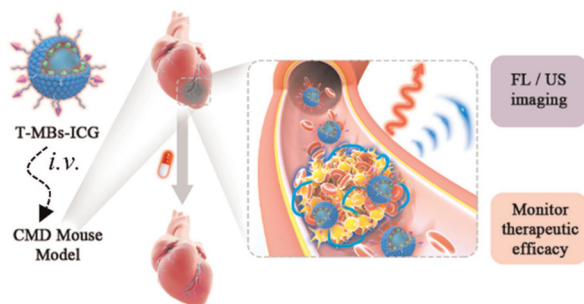
2348



Manganese Prussian blue nanozymes with antioxidant capacity prevent acetaminophen-induced acute liver injury

Chongqing Chen, Haitao Wu, Qianhui Li, Menghua Liu, Fan Yin, Miaomiao Wu, Xiaoli Wei, Hua Wang,* Zhengbao Zha* and Fei Wang*

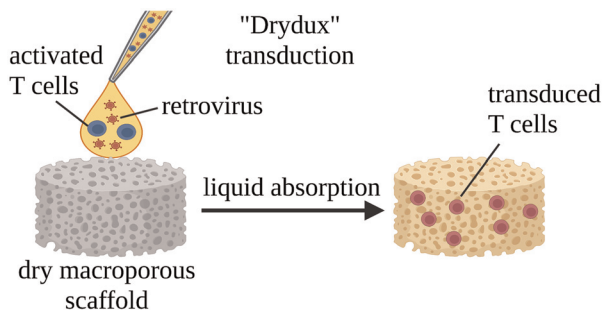
2359



Dual-modal molecular imaging and therapeutic evaluation of coronary microvascular dysfunction using indocyanine green-doped targeted microbubbles

Alimina Awen, Dehong Hu, Duyang Gao,* Zihang Wang, Yayun Wu, Hairong Zheng, Lina Guan, Yuming Mu* and Zonghai Sheng*

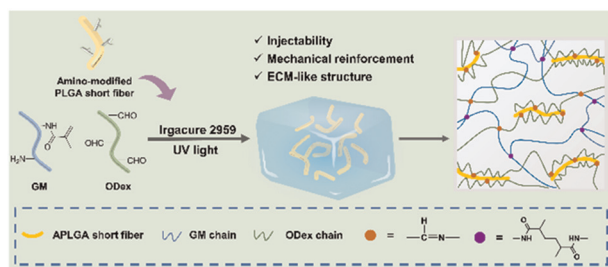
2372



Absorption rate governs cell transduction in dry macroporous scaffolds

Madelyn VanBlunk, Vishal Srikanth, Sharda S. Pandit, Andrey V. Kuznetsov and Yevgeny Brudno*

2383



In situ forming double-crosslinked hydrogels with highly dispersed short fibers for the treatment of irregular wounds

Maidi Wang, Jingtao Du, Mengya Li, Filippo Pierini, Xiaoran Li,* Jianyong Yu and Bin Ding*

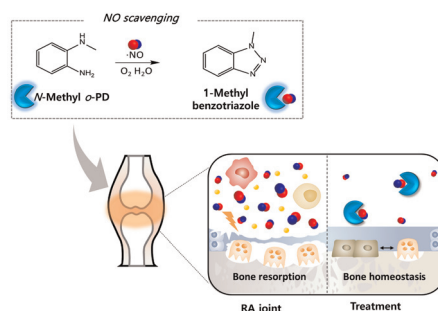


PAPERS

2395

Nitric oxide scavengers based on o-phenylenediamine for the treatment of rheumatoid arthritis

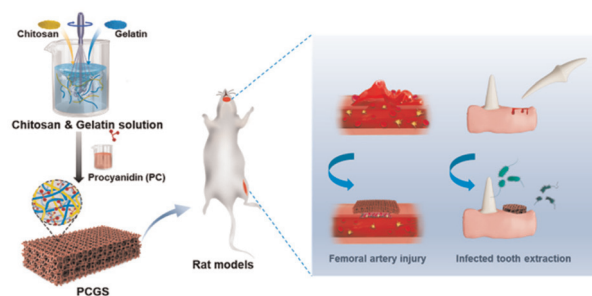
Yeong Mi Lee, Sanggi Lee and Won Jong Kim*



2405

A natural polyphenol-functionalized chitosan/gelatin sponge for accelerating hemostasis and infected wound healing

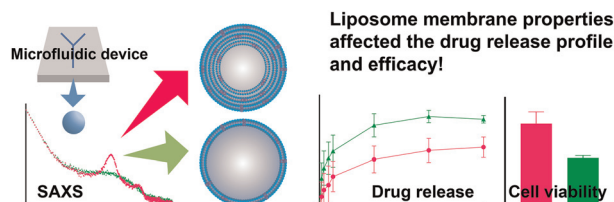
Yujie Sun, Tengfei Miao, Yu Wang, Xiaochen Wang, Jie Lin, Nana Zhao, Yang Hu* and Fu-Jian Xu*



2419

Controlling lamellarity and physicochemical properties of liposomes prepared using a microfluidic device

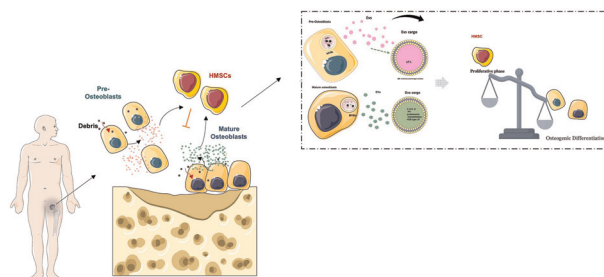
Yuka Matsuura-Sawada, Masatoshi Maeki,* Shuya Uno, Koichi Wada and Manabu Tokeshi*



2427

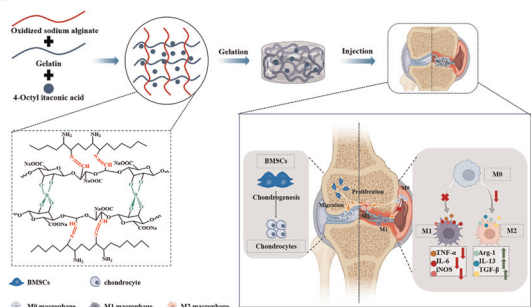
Titanium dioxide nanoparticles affect osteoblast-derived exosome cargos and impair osteogenic differentiation of human mesenchymal stem cells

Wanderson de Souza, S. Gemini-Piperni, Liliana Grenho, Luis A. Rocha, José M. Granjeiro, Sonia A. Melo, Maria H. Fernandes and Ana R. Ribeiro*



PAPERS

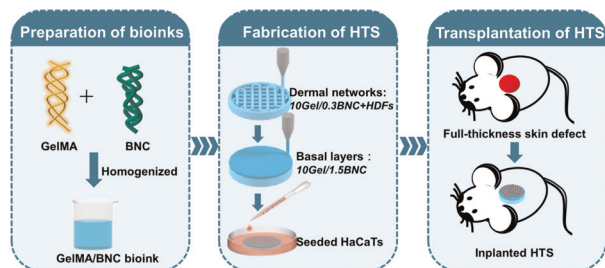
2445



Injectable hydrogel loaded with 4-octyl itaconate enhances cartilage regeneration by regulating macrophage polarization

Hui Xiao, Yunsheng Dong,* Dongdong Wan, Jinpeng Wan, Jiaxing Huang, Lizong Tang, Jie Zhou, Tingting Yang, Yufei Liu and Shufang Wang*

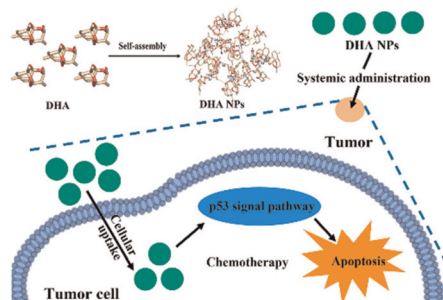
2461



3D bioprinting of heterogeneous tissue-engineered skin containing human dermal fibroblasts and keratinocytes

Meng Li, Lei Sun, Zixian Liu, Zhizhong Shen, Yanyan Cao, Lu Han, Shengbo Sang* and Jianming Wang*

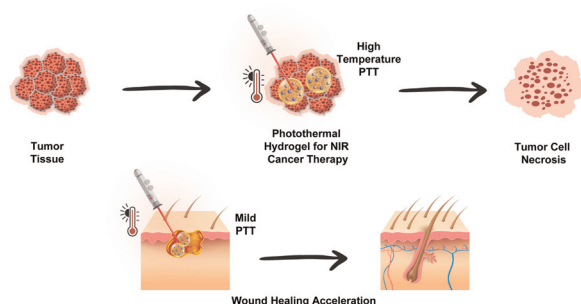
2478



Self-assembly and self-delivery of the pure nanodrug dihydroartemisinin for tumor therapy and mechanism analysis

Yawei Li, Wei Zhang, Naiyuan Shi, Wenqing Li, Junxia Bi, Xianmin Feng,* Nianqiu Shi,* Wenhe Zhu* and Zhigang Xie

2486



Metal-coordination synthesis of a natural injectable photoactive hydrogel with antibacterial and blood-aggregating functions for cancer thermotherapy and mild-heating wound repair

Kiyan Musaie, Samin Abbaszadeh, Vahideh Nosrati-Siahmazgi, Mostafa Qahremani, Shige Wang, Mohammad Reza Eskandari, Seyyed Vahid Niknezhad, Fakhri Haghi, Yulin Li, Bo Xiao* and Mohammad-Ali Shahbazi*

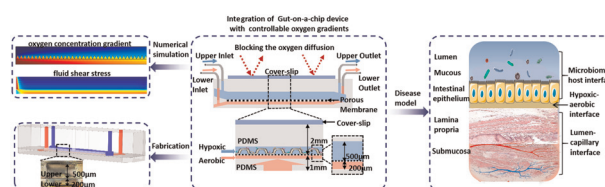


PAPERS

2504

Establishment of a gut-on-a-chip device with controllable oxygen gradients to study the contribution of *Bifidobacterium bifidum* to inflammatory bowel disease

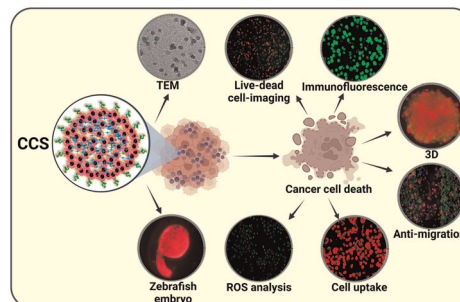
Jun Liu, Ronghao Lu, Xiaolin Zheng, Wensheng Hou, Xiaoying Wu, Hezhao Zhao, Guixue Wang and Tian Tian*



2518

Camptothecin loaded casein nanosystem for tuning the therapeutic efficacy against highly metastatic triple-negative breast cancer cells

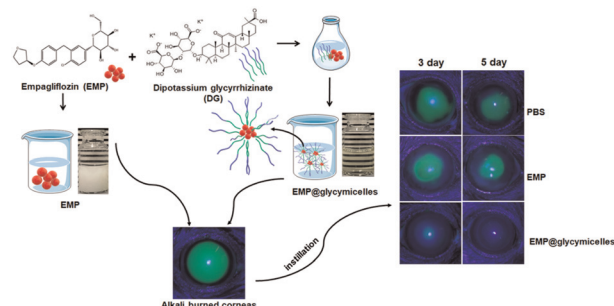
Sajmina Khatun, Monika Pebam, Chandra Lekha Putta and Aravind Kumar Rengan*



2531

A simple but novel glycyemicelle ophthalmic solution based on two approved drugs empagliflozin and glycyrrhizin: *in vitro/in vivo* experimental evaluation for the treatment of corneal alkali burns

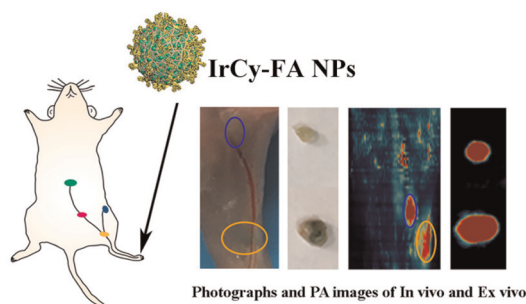
Zongjian Sun, Mingxin Zhang, Yanjun Wei, Mengshuang Li, Xianggen Wu* and Meng Xin*



2543

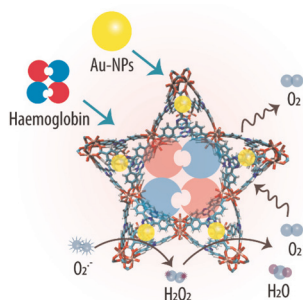
The location of metastatic lymph nodes and the evaluation of lymphadenectomy by near-infrared photoacoustic imaging with iridium complex nanoparticles

Qi Yang, Yajun Yu, Chaojie Tang, Yucong Gao, Wu Wang,* Zhiguo Zhou, Shiping Yang and Hong Yang*



PAPERS

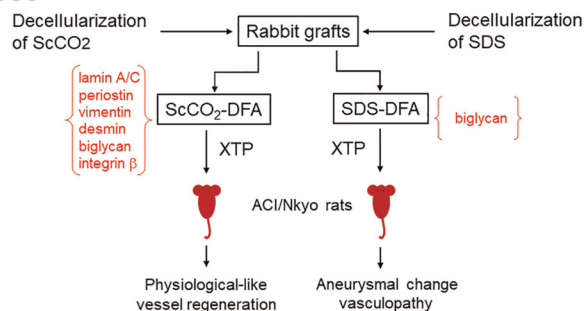
2551



Metal–organic framework-based oxygen carriers with antioxidant activity resulting from the incorporation of gold nanozymes

Xiaoli Liu, Nancy Patricio Domingues, Emad Oveisi, Clara Coll-Satue, Michelle Maria Theresia Jansman, Berend Smit and Leticia Hosta-Rigau*

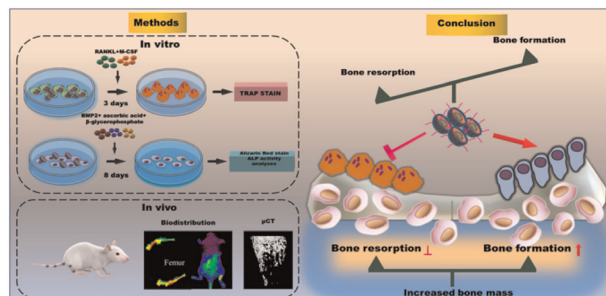
2566



Supercritical carbon dioxide-decellularized arteries exhibit physiologic-like vessel regeneration following xenotransplantation in rats

Shih-Ying Sung, Yi-Wen Lin, Chin-Chen Wu, Chih-Yuan Lin, Po-Shun Hsu, Srinivasan Periasamy, Balaji Nagarajan, Dar-Jen Hsieh, Yi-Ting Tsai,* Chien-Sung Tsai* and Feng-Yen Lin*

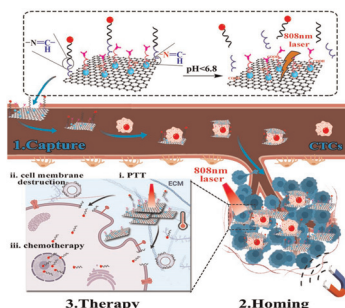
2581



Nano-formulations for bone-specific delivery of siRNA for *Crkl* silencing-induced regulation of bone formation and resorption to maximize therapeutic potential for bone-related diseases

Semun Seong, Veena Vijayan, Jung Ha Kim, Kabsun Kim, Inyoung Kim, Kondareddy Cherukula, In-Kyu Park* and Nacksung Kim*

2590



Manipulation and elimination of circulating tumor cells using multi-responsive nanosheet for malignant tumor therapy

Tao Liu, Bolei Cai, Pingyun Yuan, Le Wang, Ran Tian, Taiqiang Dai, Lin Weng and Xin Chen*



CORRECTIONS

2603

Correction: Carbazate-modified cross-linked dextran microparticles suppress the progression of osteoarthritis by ROS scavenging

Yanfeng Ding, Zhimin Li, Wenwen Hu, Xianjing Feng, Ying Chen, Guohua Yan, Yonglin Wang, Bo Zhu, Wei Yao, Li Zheng,* Maolin He,* Ming Gao* and Jinmin Zhao

2605

Correction: Preparation and characterizations of an injectable and biodegradable high-strength iron-bearing brushite cement for bone repair and vertebral augmentation applications

Luguang Ding, Huan Wang, Jiaying Li, Dachuan Liu, Jianzhong Bai, Zhangqin Yuan, Jiaojiao Yang, Lu Bian, Xijiang Zhao,* Bin Li* and Song Chen*

