Materials Horizons

rsc.li/materials-horizons

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 2051–6347 CODEN MHAOAL 10(5) 1457–1886 (2023)

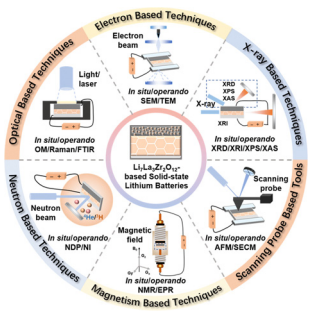
Cover
See Qionghua Zhou, Wan-Jian Yin, Weiqiao Deng, Jinlan Wang *et al.*, pp. 1651–1660. Image reproduced by permission of Jinlan Wang from *Mater. Horiz.*, 2023, **10**, 1651. The robot in the image was created by DALL-E from Open AI.

Inside cover
See Quanchao Zhuang, Hamidreza Arandiyan, Yanguo Liu *et al.*, pp. 1479–1538. Image reproduced by permission of Hamid Arandiyan from *Mater. Horiz.*, 2023, **10**, 1479.

EDITORIAL

Materials Horizons
Outstanding Paper Award

REVIEWS



Materials Horizons (electronic: ISSN 2051-6355) is published 12 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: £2697, $4615. 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.

ROYAL SOCIETY OF CHEMISTRY

Materials Horizons

rsc.li/materials-horizons

Building and designing systems from the molecular level

Information for Authors

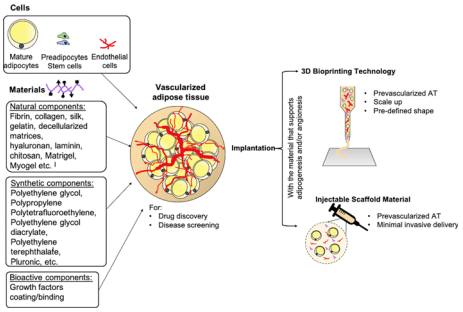
Full details on how to submit material for publication in Materials Horizons are given in the Instructions for Authors (available from **http://www.rsc.org/authors**). Submissions should be made via the journal's homepage: **rsc.li/materials-horizons.**
Submissions: The journal welcomes submissions of manuscripts for publication as Communications, Reviews, Mini-reviews and Focus Articles. Communications should contain exceptionally significant scientific work of such importance that rapid publication is desirable. The research presented should provide new insight into the topic and be accessible to the broad readership of the journal.

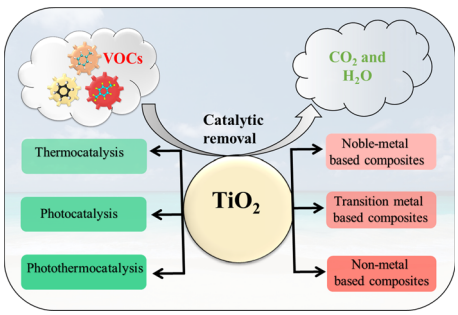
Colour figures are reproduced free of charge. Additional details are available from the Editorial Office or **http://www.rsc.org/authors**

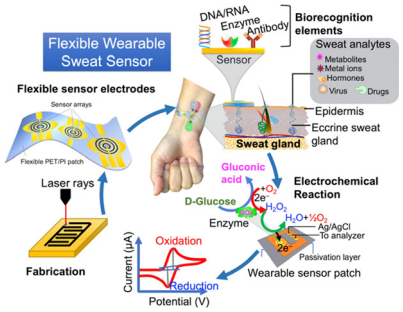
Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)–Reproduced by permission of the Royal Society of Chemistry.

Registered charity number: 207890

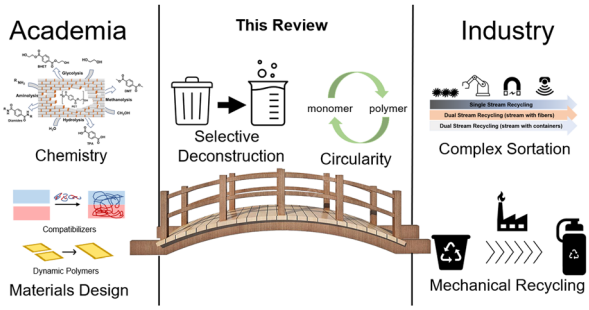
REVIEWS



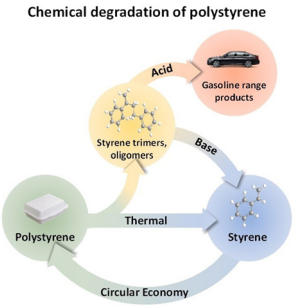




MINIREVIEWS



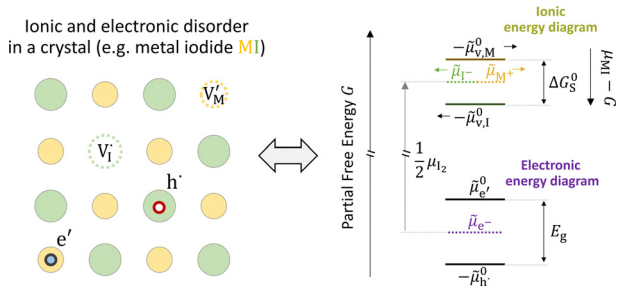
MINIREVIEWS



Catalytic routes towards polystyrene recycling

Carlos Marquez,* Cristina Martin, Noemi Linares and Dirk De Vos*

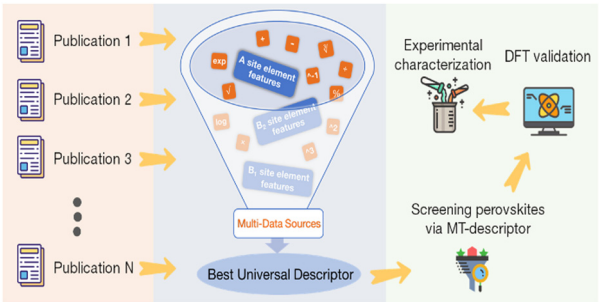
FOCUS



Ionic and electronic energy diagrams for hybrid perovskite solar cells

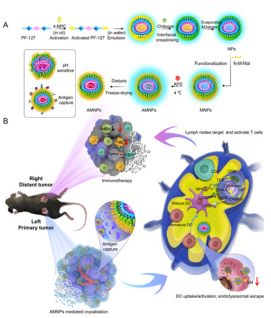
Davide Moia* and Joachim Maier

COMMUNICATIONS



Distilling universal activity descriptors for perovskite catalysts from multiple data sources *via* multi-task symbolic regression

Zhilong Song, Xiao Wang, Fangting Liu, Qionghua Zhou,* Wan-Jian Yin,* Hao Wu, Weiqiao Deng* and Jinlan Wang*



Autologous-cancer-cryoablation-mediated nanovaccine augments systematic immunotherapy

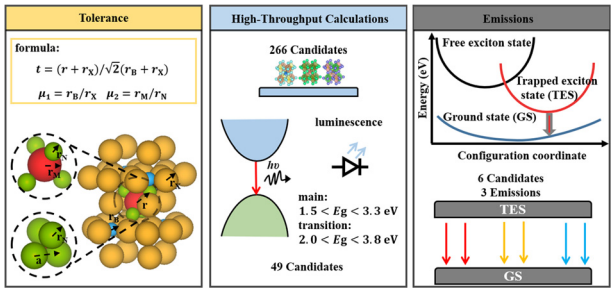
Zhongyang Yu, Dawei Wang, Yuxia Qi, Jing Liu, Tian Zhou,* Wei Rao* and Kaiwen Hu*

COMMUNICATIONS

1678

Eco-friendly inorganic molecular novel antiperovskites for light-emitting application

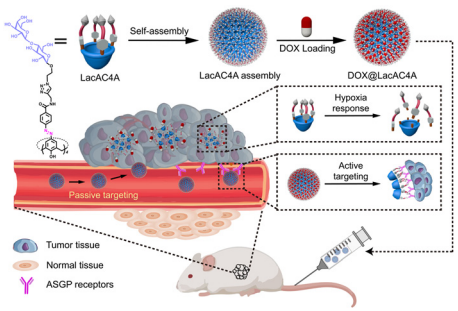
Jiawei Luo, Qun Ji, Yilei Wu, Xinying Gao, Jinlan Wang and Ming-Gang Ju*



1689

Triple targeting host–guest drug delivery system based on lactose-modified azocalix[4]arene for tumor ablation

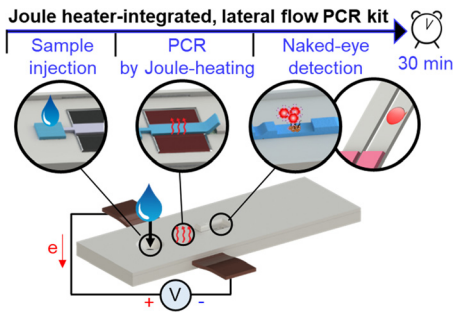
Juan-Juan Li, Rui-Xue Rong, Yan Yang, Zong-Ying Hu, Bing Hu, Ying-Ying Zhao, Hua-Bin Li, Xin-Yue Hu,* Ke-Rang Wang* and Dong-Sheng Guo*



1697

Rapid PCR kit: lateral flow paper strip with Joule heater for SARS-CoV-2 detection

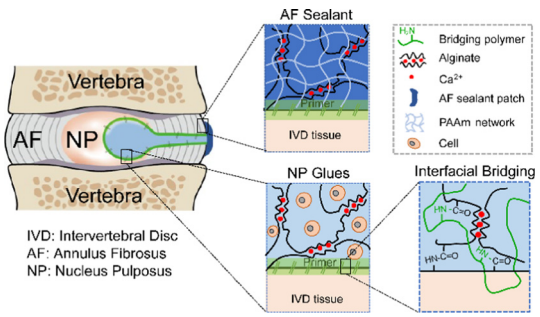
Kihyeun Kim, Bobin Lee, Jun Hyeok Park, Ji-Ho Park, Ki Joong Lee, Tae Joon Kwak, Taehwang Son, Yong-Beom Shin, Hyungsoon Im and Min-Gon Kim*



1705

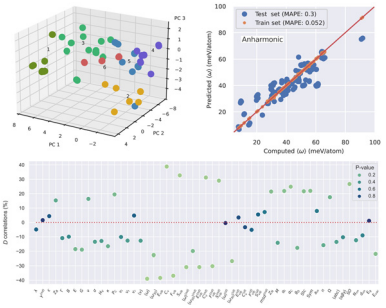
Tissue-mimetic hybrid bioadhesives for intervertebral disc repair

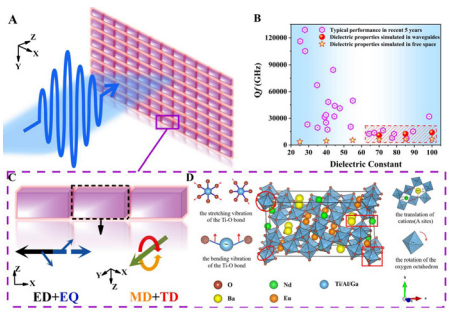
Xuan Li, Yin Liu, Li Li, Ran Huo, Farshid Ghezelbash, Zhenwei Ma, Guangyu Bao, Shiyu Liu, Zhen Yang, Michael H. Weber, Nicole Y. K. Li-Jessen, Lisbet Haglund* and Jianyu Li*

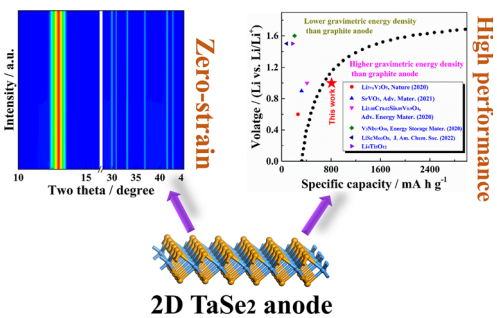


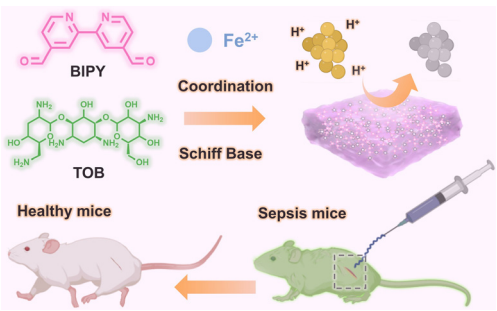
COMMUNICATIONS

COMMUNICATIONS



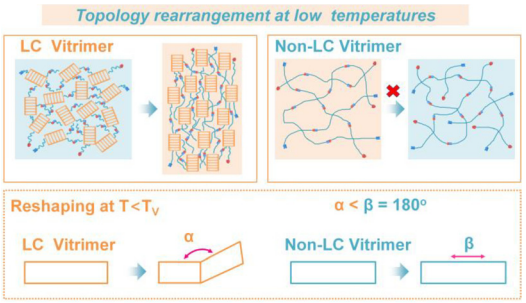






COMMUNICATIONS

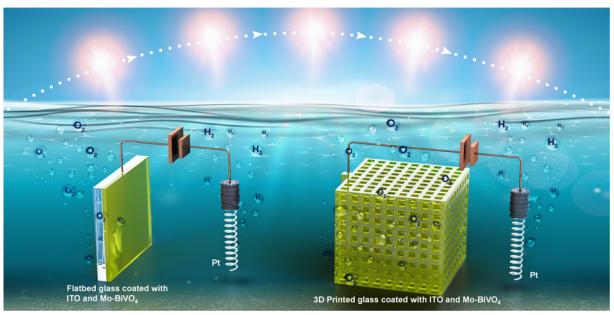
1795



Fabricating liquid crystal vitrimer actuators far below the normal processing temperature

Yanjin Yao, Enjian He, Hongtu Xu, Yawen Liu, Yen Wei and Yan Ji*

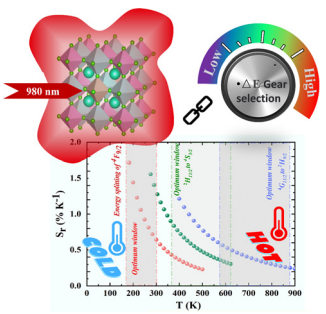
1806



Angle-independent solar radiation capture by 3D printed lattice structures for efficient photoelectrochemical water splitting

Chidanand Hegde, Tamar Rosental, Joel Ming Rui Tan, Shlomo Magdassi* and Lydia Helena Wong*

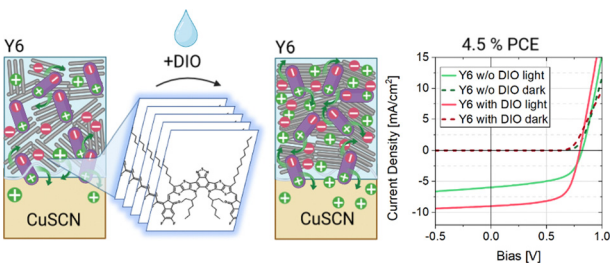
1816



Targeted high-precision up-converting thermometer platform over multiple temperature zones with Er^{3+}

Zhihui Rao, Zhilin Li, Xiujian Zhao and Xiao Gong*

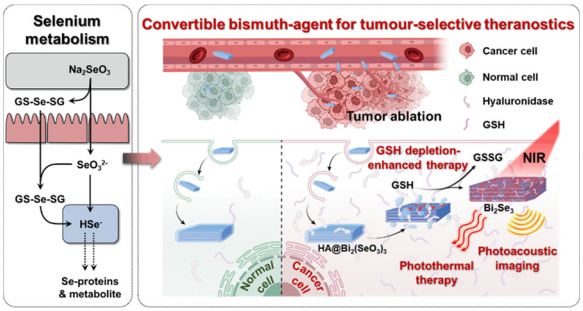
1825

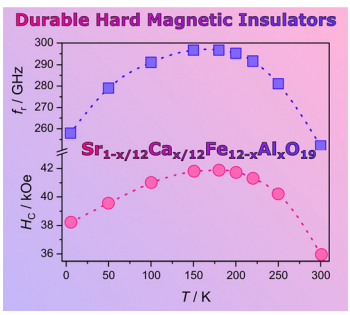


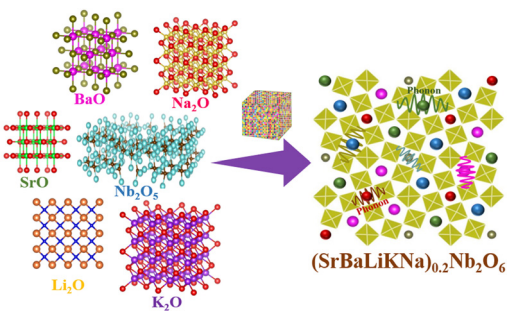
What is special about Y6; the working mechanism of neat Y6 organic solar cells

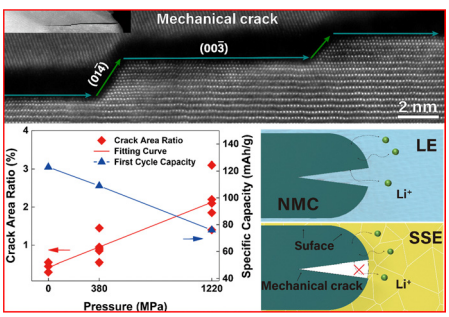
Elifnaz Sağlamkaya, Artem Musiienko, Mohammad Saeed Shadabroo, Bowen Sun, Sreelakshmi Chandrabose, Oleksandra Shargaieva, Giulia Lo Gerfo M., Niek F. van Hulst and Safa Shoaee*

COMMUNICATIONS

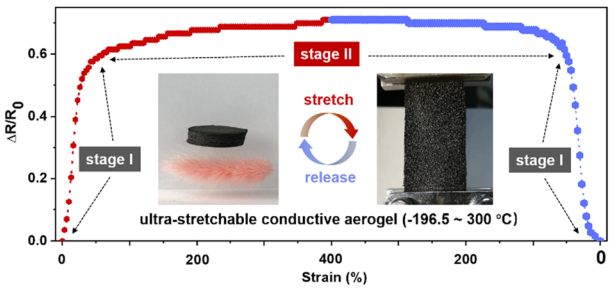






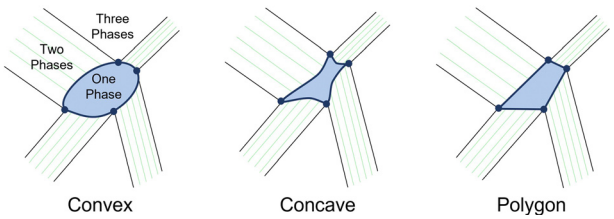


COMMUNICATIONS



Ultra-stretchable graphene aerogels at ultralow temperatures

Guohui Yang, Xiaofang Zhang, Ruijia Wang, Xu Liu, Jianming Zhang, Lu Zong* and Hongsheng Yang*



Shapes of phases in isothermal phase diagrams: what is wrong with the Thermo-Calc logo

Adetoye H. Adekoya, Shashwat Anand and G. Jeffrey Snyder*

CORRECTION

Correction: Tuning the arrangement of lamellar nanostructures: achieving the dual function of physically killing bacteria and promoting osteogenesis

Shi Mo, Kaiwei Tang, Qing Liao, Lingxia Xie, Yuzheng Wu, Guomin Wang, Qingdong Ruan, Ang Gao, Yuanliang Lv, Kaiyong Cai, Liping Tong,* Zhengwei Wu,* Paul K Chu and Huaiyu Wang*