

# 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 54(1) 1-516 (2025)



### Cover

See Guillaume Gines, Anthony J. Genot, Jeff Nivala, Yannick Rondelez, Ryuji Kawano *et al.*, pp. 8–32. Image reproduced by permission of Robin Hoshino from *Chem. Soc. Rev.*, 2025, **54**, 8. Artwork by Robin Hoshino.



### Inside cover

See Tom Van Gerven, Simon Kuhn *et al.*, pp. 85–115. Image reproduced by permission of Simon Kuhn from *Chem. Soc. Rev.*, 2025, **54**, 85.

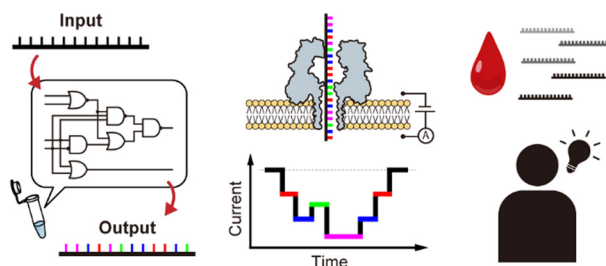
## TUTORIAL REVIEWS

8

### Harnessing DNA computing and nanopore decoding for practical applications: from informatics to microRNA-targeting diagnostics

Sotaro Takiguchi, Nanami Takeuchi, Vasily Shenshin, Guillaume Gines,\* Anthony J. Genot,\* Jeff Nivala,\* Yannick Rondelez\* and Ryuji Kawano\*

#### DNA computing ► Nanopore decoding ► Diagnostics

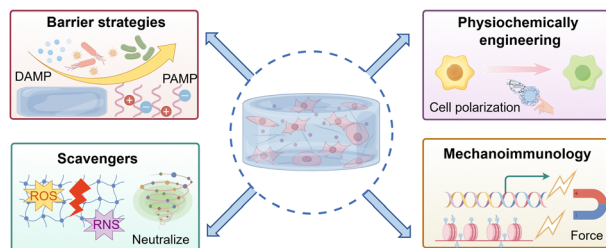


33

### Intrinsic immunomodulatory hydrogels for chronic inflammation

Yuna Qian, Jiayi Ding, Rui Zhao, Yang Song, Jiyoung Yoo, Huiyeon Moon, Seyoung Koo,\* Jong Seung Kim\* and Jianliang Shen\*

#### Intrinsic Immunomodulatory Hydrogel



GOLD  
OPEN  
ACCESS

# EES Batteries

Exceptional research on  
batteries and energy storage

Part of the EES family



**Join  
in** | Publish with us  
[rsc.li/EESBatteries](https://rsc.li/EESBatteries)

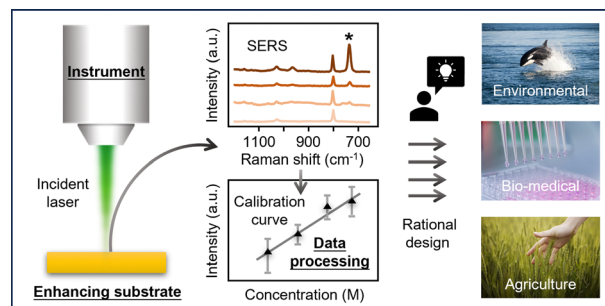


## TUTORIAL REVIEWS

62

## A practical approach to quantitative analytical surface-enhanced Raman spectroscopy

Yikai Xu,\* Wafaa Aljuhani, Yingrui Zhang, Ziwei Ye, Chun Chun Li\* and Steven E. J. Bell\*

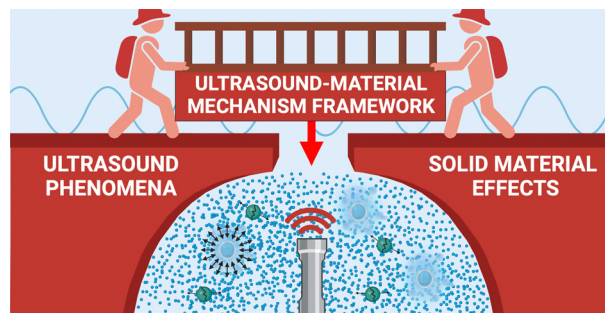


## REVIEW ARTICLES

85

## Ultrasound mechanisms and their effect on solid synthesis and processing: a review

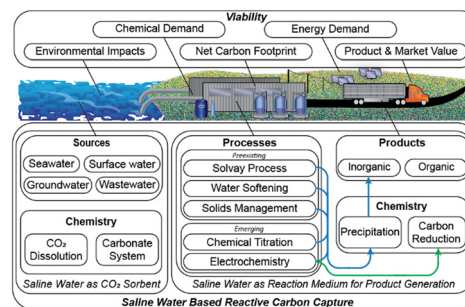
Cedric Devos, Ariana Bampouli, Elena Brozzi, Georgios D. Stefanidis, Michiel Dusseleir, Tom Van Gerven\* and Simon Kuhn\*



116

## Reactive carbon capture using saline water: evaluation of prospective sources, processes, and products

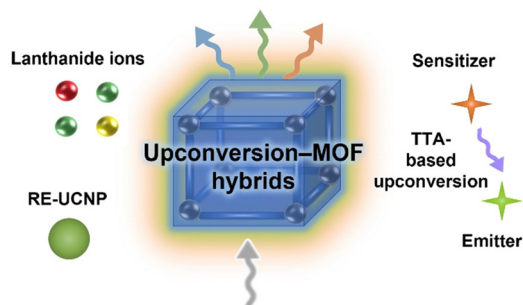
Anya Dickinson-Cove, Erika La Plante, Yiming Liu, Dante Simonetti, Eric M. V. Hoek, Gaurav Sant and David Jassby\*



152

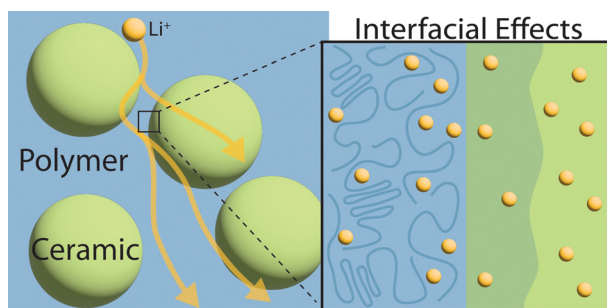
## Metal-organic framework-based hybrids with photon upconversion

Xiaokai Chen, Xiaodong Zhang and Yanli Zhao\*



## REVIEW ARTICLES

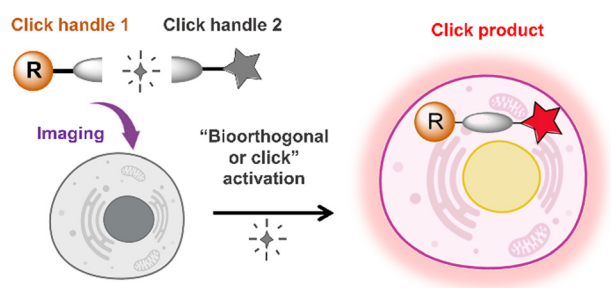
178



### A critical review on Li-ion transport, chemistry and structure of ceramic–polymer composite electrolytes for solid state batteries

Sara Catherine Sand, Jennifer L. M. Rupp\* and Bilge Yildiz\*

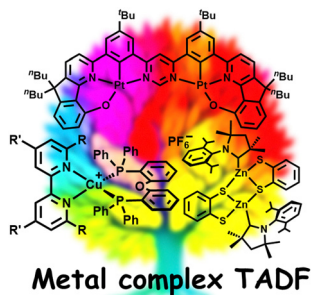
201



### Bioorthogonally activated probes for precise fluorescence imaging

Youxin Fu, Xing Zhang, Luling Wu, Miaomiao Wu, Tony D. James\* and Run Zhang\*

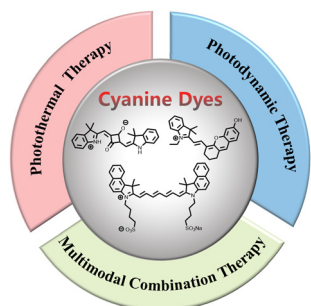
266



### Metal complex-based TADF: design, characterization, and lighting devices

Afsaneh Farokhi, Sophia Lipinski, Luca M. Cavinato, Hashem Shahroosvand,\* Babak Pashaei, Soheila Karimi, Sebastiano Bellani, Francesco Bonaccorso and Rubén D. Costa\*

341



### Design strategies and applications of cyanine dyes in phototherapy

Jie Yuan, Hanxue Yang, Wenhui Huang, Shilong Liu, Hua Zhang,\* Xiaobing Zhang\* and Xiaojun Peng\*

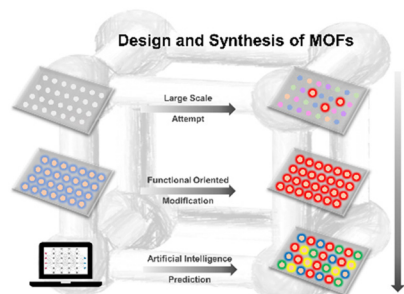


## REVIEW ARTICLES

367

## Development of the design and synthesis of metal–organic frameworks (MOFs) – from large scale attempts, functional oriented modifications, to artificial intelligence (AI) predictions

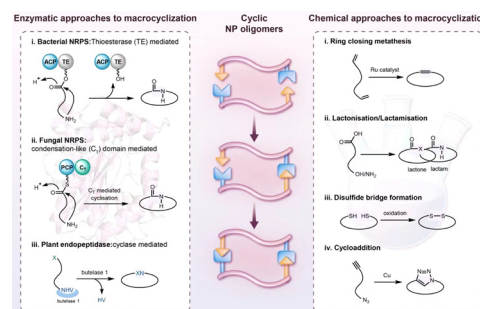
Zongsu Han, Yihao Yang, Joshua Rushlow, Jiatong Huo, Zhaoyi Liu, Yu-Chuan Hsu, Rujie Yin, Mengmeng Wang, Rongran Liang, Kun-Yu Wang and Hong-Cai Zhou\*



396

## Cyclic natural product oligomers: diversity and (bio)synthesis of macrocycles

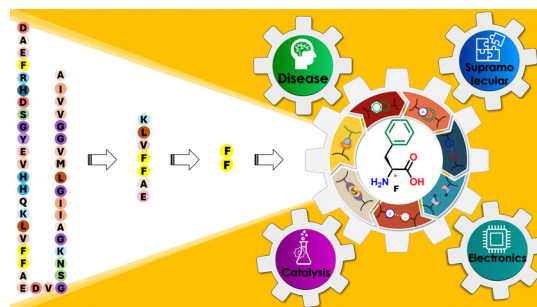
Songya Zhang, Shuai Fan, Haocheng He, Jing Zhu, Lauren Murray, Gong Liang, Shi Ran, Yi Zhun Zhu, Max J. Cryle,\* Hai-Yan He\* and Youming Zhang\*



465

## Amyloid inspired single amino acid (phenylalanine)-based supramolecular functional assemblies: from disease to device applications

Subrat Vishwakarma, Om Shanker Tiwari, Ruchi Shukla, Ehud Gazit\* and Pandeewar Makam\*



484

## Exploring high-connectivity three-dimensional covalent organic frameworks: topologies, structures, and emerging applications

Fengqian Chen, Haorui Zheng, Yusran Yusran, Hui Li,\* Shilun Qiu and Qianrong Fang\*

