

# Chemical Science

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## IN THIS ISSUE

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### Cover

See Kun Jiang, Ye Wei et al., pp. 7502–7514. Image reproduced by permission of Ye Wei from *Chem. Sci.*, 2024, 15, 7502.



### Inside cover

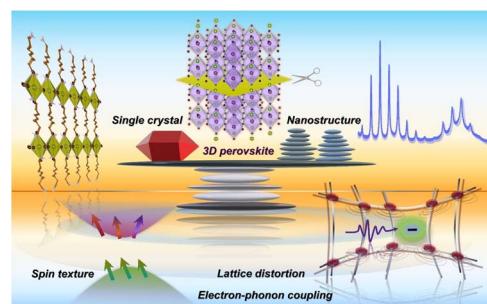
See Michel Rickhaus, Sabine Richert et al., pp. 7515–7523. Image reproduced by permission of Sabine Richert from *Chem. Sci.*, 2024, 15, 7515.

## PERSPECTIVES

7374

### Optoelectronic insights of lead-free layered halide perovskites

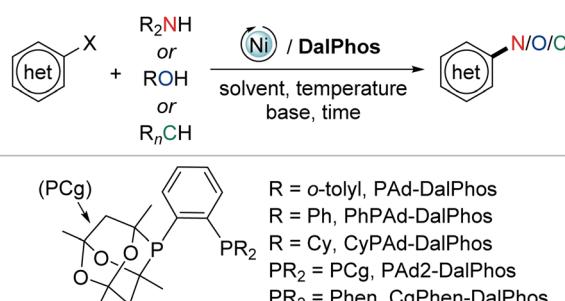
Vishwadeepa Hazra, Arnab Mandal and Sayan Bhattacharyya\*



7394

### The development of cage phosphine 'DalPhos' ligands to enable nickel-catalyzed cross-couplings of (hetero)aryl electrophiles

Kathleen M. Morrison and Mark Stradiotto\*



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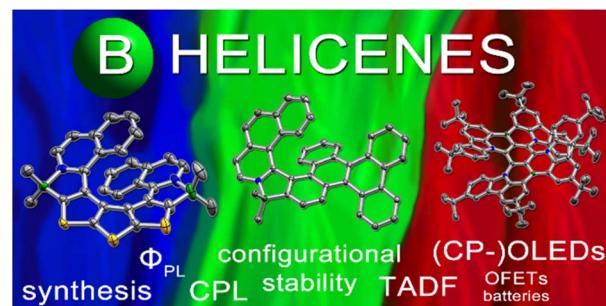
Registered charity number: 207890

## PERSPECTIVES

7408

**Boron-containing helicenes as new generation of chiral materials: opportunities and challenges of leaving the flatland**

Agnieszka Nowak-Król,\* Patrick T. Geppert and Kenkera Rayappa Naveen

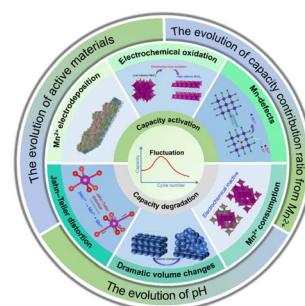


## REVIEWS

7441

**Insights into the cycling stability of manganese-based zinc-ion batteries: from energy storage mechanisms to capacity fluctuation and optimization strategies**

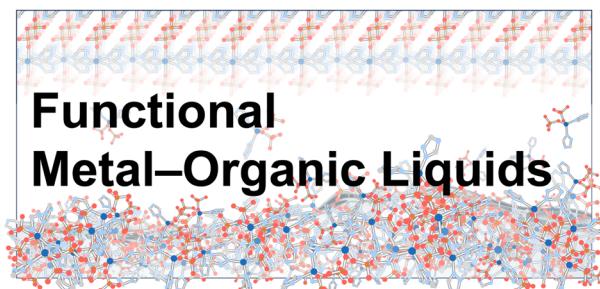
Yanxin Liao, Chun Yang, Jie Bai, Qingqing He, Huayu Wang, Haichao Chen,\* Qichun Zhang\* and Lingyun Chen\*



7474

**Functional metal–organic liquids**

Nattapol Ma,\* Soracha Kosasang, Ellan K. Berdichevsky, Taichi Nishiguchi and Satoshi Horike\*

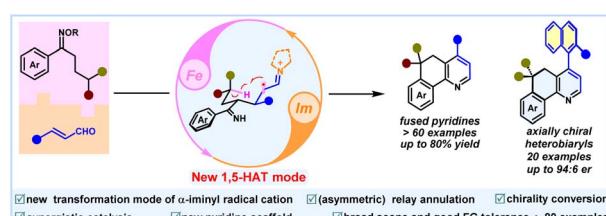


## EDGE ARTICLES

7502

**1,5-Hydrogen atom transfer of  $\alpha$ -iminy radical cations: a new platform for relay annulation for pyridine derivatives and axially chiral heterobiaryls**

Yu-Qiang Zhou, Kui-Cheng He, Wei-Hao Zheng, Jing-Fang Lv, Shi-Mei He, Ning Yu, Yun-Bo Yang, Lv-Yan Liu, Kun Jiang\* and Ye Wei\*

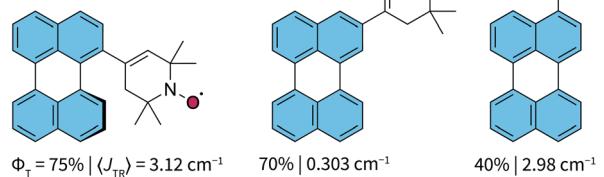


## EDGE ARTICLES

7515

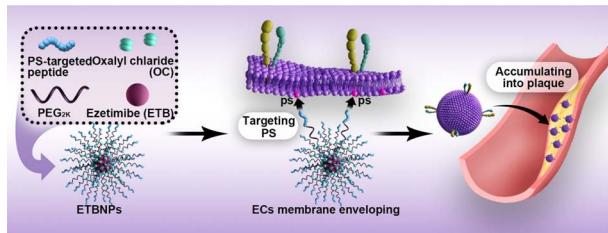
**A matter of position?**

How small  $\pi$ -systems communicate with spins and why it is not as simple as it looks

**Influence of the substitution position on spin communication in photoexcited perylene–nitroxide dyads**

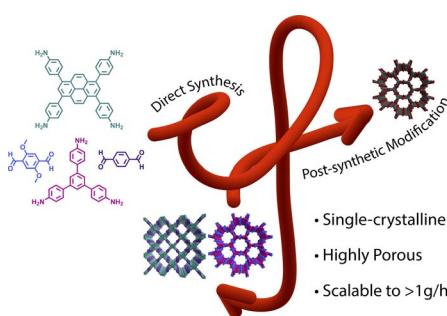
Philipp Thielert, Mélissa El Bitar Nehme, Maximilian Mayländer, Michael Franz, Simon L. Zimmermann, Fabienne Fisch, Peter Gilch, Andreas Vargas Jentzsch, Michel Rickhaus\*, and Sabine Richert\*

7524

**Universal cell membrane camouflaged nano-prodrugs with right-side-out orientation adapting for positive pathological vascular remodeling in atherosclerosis**

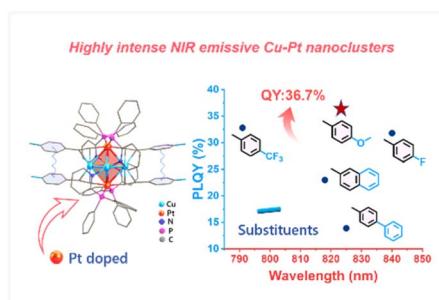
Xian Qin, Li Zhu, Yuan Zhong, Yi Wang, Xiaoshan Luo, Jiawei Li, Fei Yan, Guicheng Wu, Juhui Qiu, Guixue Wang, Kai Qu,\* Kun Zhang\* and Wei Wu\*

7545

**Continuous flow synthesis and post-synthetic conversion of single-crystalline covalent organic frameworks**

Michael Traxler and William R. Dichtel\*

7552

**Highly intense NIR emissive Cu<sub>4</sub>Pt<sub>2</sub> bimetallic clusters featuring Pt(i)–Cu<sub>4</sub>–Pt(i) sandwich kernel**

Rui-Ru Zhong, Mo Xie, Cui-Zhou Luan, Lin-Mei Zhang, De-Bo Hao, Shang-Fu Yuan\* and Tao Wu\*

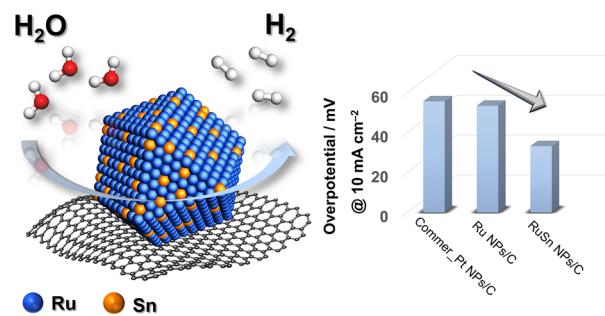


## EDGE ARTICLES

7560

## First synthesis of RuSn solid-solution alloy nanoparticles and their enhanced hydrogen evolution reaction activity

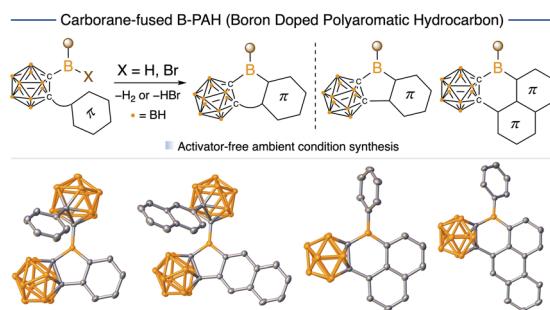
Xin Zhou, Megumi Mukoyoshi,\* Kohei Kusada, Tomokazu Yamamoto, Takaaki Toriyama, Yasukazu Murakami, Shogo Kawaguchi, Yoshiki Kubota, Okkyun Seo, Osami Sakata, Toshiaki Ina and Hiroshi Kitagawa\*



7568

## Carborane–arene fused boracyclic analogues of polycyclic aromatic hydrocarbons accessed by intramolecular borylation

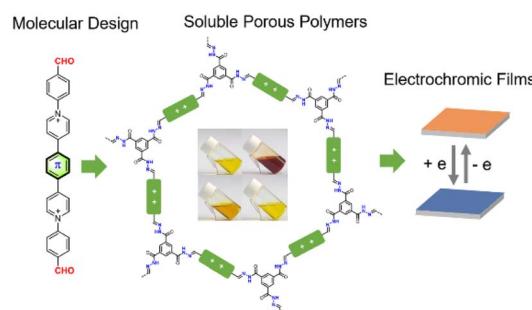
Yijie Li, Masilamani Tamizmani, Manjur O. Akram and Caleb D. Martin\*



7576

## Viologen-based solution-processable ionic porous polymers for electrochromic applications

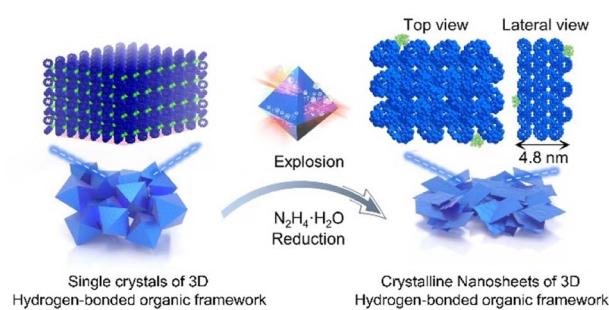
Hongya Miao, Ling Chen, Fangfang Xing, Huijie Li, Thomas Baumgartner\* and Xiaoming He\*



7586

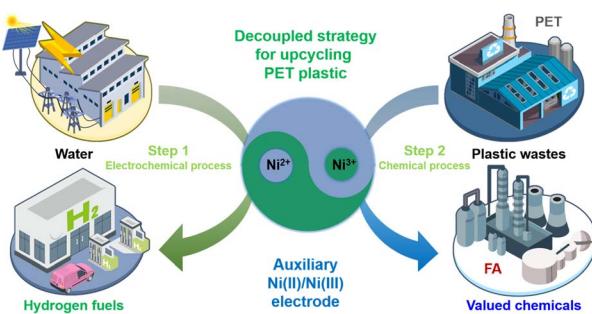
## Crystalline nanosheets of three-dimensional supramolecular frameworks with uniform thickness and high stability

Xinxin Wang, Yucheng Jin, Tianyu Zheng, Ning Li, Yuesheng Han, Baoqiu Yu, Kang Wang,\* Dongdong Qi,\* Tianyu Wang\* and Jianzhuang Jiang\*



## EDGE ARTICLES

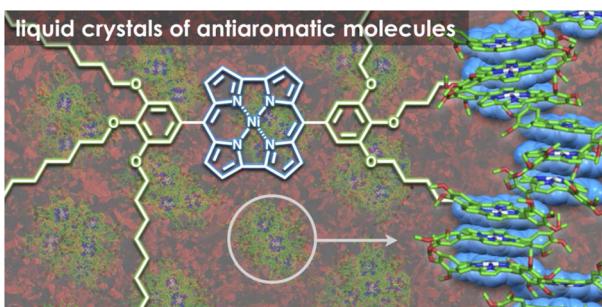
7596



**Photovoltaic-driven Ni(II)/Ni(III) redox mediator for the valorization of PET plastic waste with hydrogen production**

Jianying Wang, Xin Li, Ting Zhang, Xinyu Chai, Mingze Xu, Menglei Feng, Chengcheng Cai, Zuofeng Chen,\* Xufang Qian\* and Yixin Zhao\*

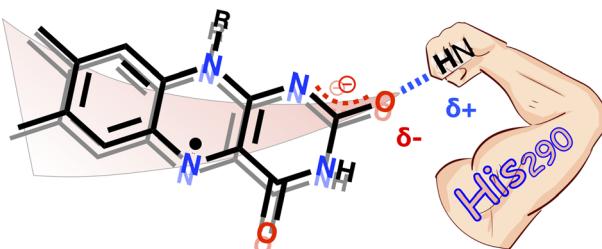
7603



**Norcorroles as antiaromatic  $\pi$ -electronic systems that form dimension-controlled assemblies**

Soh Ishikawa, Kazuhisa Yamasumi, Shinya Sugiura, Shunsuke Sato, Go Watanabe, Yun Hee Koo, Shu Seki, Yuya Bando, Yohei Haketa, Hiroshi Shinokubo and Hiromitsu Maeda\*

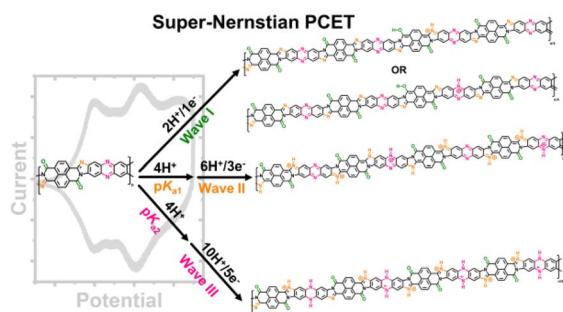
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**A single hydrogen bond that tunes flavin redox reactivity and activates it for modification**

Debarati Das and Anne-Frances Miller\*

7623



**Observation of super-Nernstian proton-coupled electron transfer and elucidation of nature of charge carriers in a multiredox conjugated polymer**

Duyen K. Tran, Sarah M. West, Elizabeth M. K. Speck and Samson A. Jenekhe\*

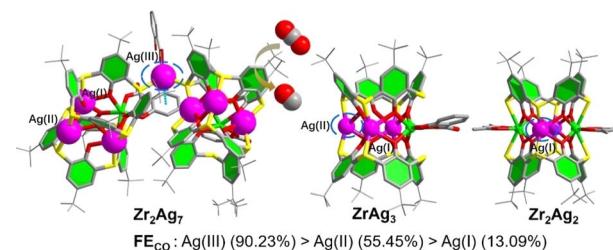


## EDGE ARTICLES

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**Ag<sup>1+</sup> incorporation via a Zr<sup>4+</sup>-anchored metallocligand: fine-tuning catalytic Ag sites in Zr/Ag bimetallic clusters for enhanced eCO<sub>2</sub>RR-to-CO activity**

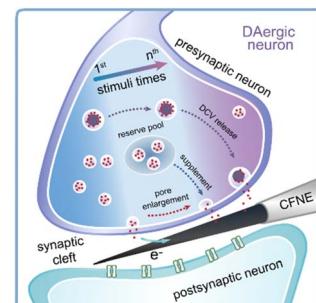
Liang-Jun Li, Wen-Lei Mu, Yi-Qi Tian, Wei-Dong Yu,\* Lan-Yan Li,\* Jun Yan and Chao Liu\*



7651

**Nanoelectrochemistry reveals how presynaptic neurons regulate vesicle release to sustain synaptic plasticity under repetitive stimuli**

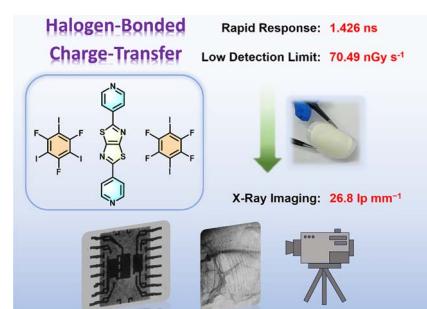
Fu-Li Zhang, Xiao-Ke Yang, Yu-Ting Qi, Si-Yu Tian and Wei-Hua Huang\*



7659

**Halogen-bonded charge-transfer co-crystal scintillators for high-resolution X-ray imaging**

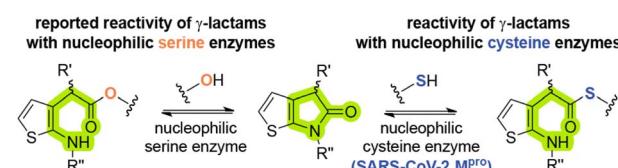
Yu-Hua Chen, Guo-Zhen Zhang, Fu-Hai Chen, Shu-Quan Zhang, Xin Fang,\* Hong-Ming Chen\* and Mei-Jin Lin\*



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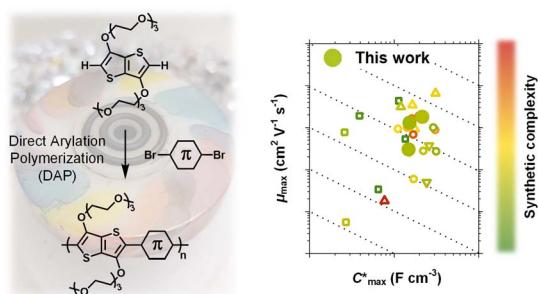
**Thiophene-fused  $\gamma$ -lactams inhibit the SARS-CoV-2 main protease via reversible covalent acylation**

Gayatri, Lennart Brewitz,\* Lewis Ibbotson, Eidarus Salah, Shyam Basak, Hani Choudhry and Christopher J. Schofield\*



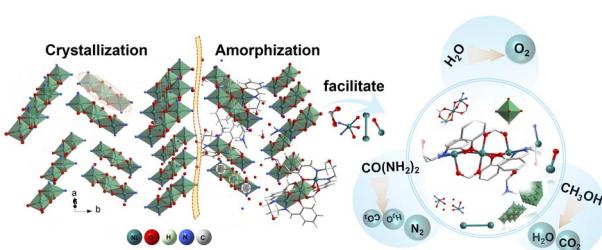
## EDGE ARTICLES

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**High-mobility organic mixed conductors with a low synthetic complexity index via direct arylation polymerization**

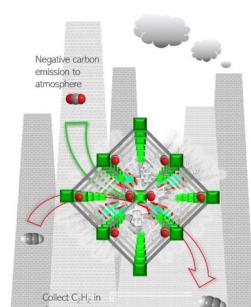
Joost Kimpel,\* Youngseok Kim, Jesika Asatryan, Jaime Martín, Renee Kroon and Christian Müller\*

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**Amorphous conversion in pyrolytic symmetric trinuclear nickel clusters trigger trifunctional electrocatalysts**

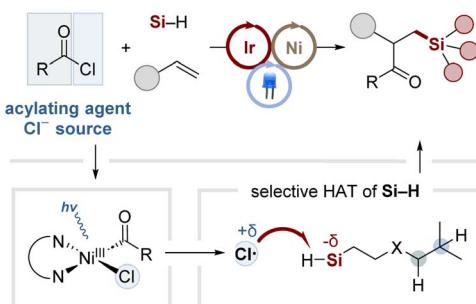
Li Li, Hui-Feng Zhao, Mei-Xing Gan, Tao Zhang, Jia-Ning Li, Shi Tao,\* Jing Peng, Hai-Bin Yu\* and Xu Peng\*

7698

**An adsorbate biased dynamic 3D porous framework for inverse CO<sub>2</sub> sieving over C<sub>2</sub>H<sub>2</sub>**

Nivedita Sikdar, Subhajit Laha, Rohan Jena, Anupam Dey, Faruk Ahamed Rahimi and Tapas Kumar Maji\*

7707

**Nickel/photoredox-catalyzed three-component silylation of acrylates via chlorine photoelimination**

Yejin Koo and Sungwoo Hong\*

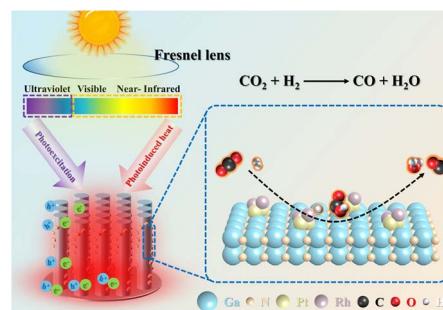


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7714

**Photo-thermal synergistic  $\text{CO}_2$  hydrogenation towards CO over PtRh bimetal-decorated GaN nanowires/Si**

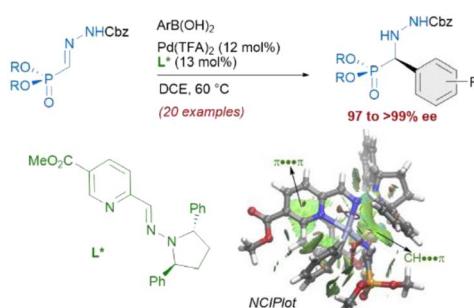
Jinglin Li, Bowen Sheng, Liang Qiu, Jiajia Yang, Ping Wang,\* Yixin Li, Tianqi Yu, Hu Pan, Ying Li, Muhan Li, Lei Zhu,\* Xinqiang Wang,\* Zhen Huang and Baowen Zhou\*



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**Enantioselective synthesis of  $\alpha$ -aryl  $\alpha$ -hydrazino phosphonates**

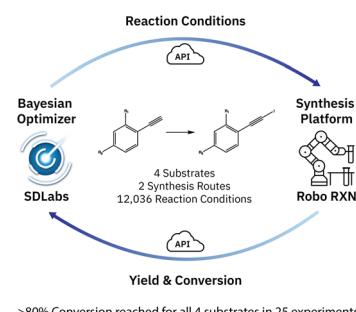
Saúl Alberca, Javier Romero-Parra, Israel Fernández,\* Rosario Fernández,\* José M. Lassaletta\* and David Monge\*



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**Combining Bayesian optimization and automation to simultaneously optimize reaction conditions and routes**

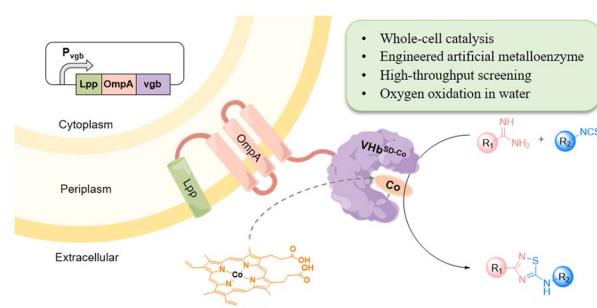
Oliver Schilter,\* Daniel Pacheco Gutierrez, Linnea M. Folkmann, Alessandro Castrogiovanni, Alberto García-Durán, Federico Zipoli, Loïc M. Roch and Teodoro Laino



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**Directed evolution of *Escherichia coli* surface-displayed *Vitreoscilla* hemoglobin as an artificial metalloenzyme for the synthesis of 5-imino-1,2,4-thiadiazoles**

Yanling Xu, Fengxi Li, Hanqing Xie, Yuyang Liu, Weiwei Han, Junhao Wu, Lei Cheng, Chunyu Wang, Zhengqiang Li\* and Lei Wang\*



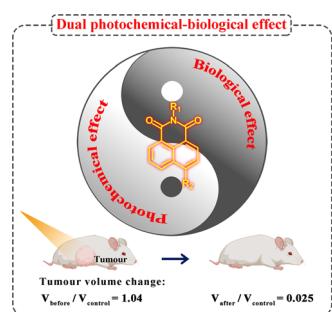
## EDGE ARTICLES

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**Biosynthesis of the bacterial antibiotic 3,7-dihydroxytropolone through enzymatic salvaging of catabolic shunt products**

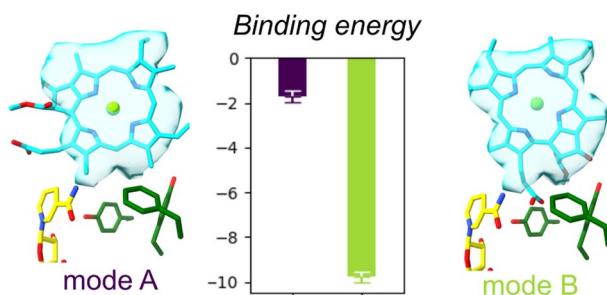
Lars Höing, Sven T. Sowa, Marina Toplak, Jakob K. Reinhardt, Roman Jakob, Timm Maier, Markus A. Lill and Robin Teufel\*

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**Photochemical and biological dual-effects enhance the inhibition of photosensitizers for tumour growth**

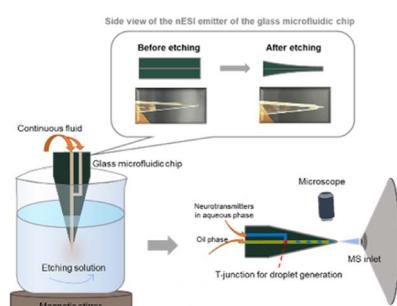
Huiyu Niu, Yang Liu, Yafu Wang, Yonggang Yang, Ge Wang, Tony D. James, Jonathan L. Sessler\* and Hua Zhang\*

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**Elucidating substrate binding in the light-dependent protochlorophyllide oxidoreductase**

Penelope Pesara, Katarzyna Szafran, Henry C. Nguyen, Abhishek Sirohiwal, Dimitrios A. Pantazis\* and Michal Gabruk\*

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**Monolithic 3D nanoelectrospray emitters based on a continuous fluid-assisted etching strategy for glass droplet microfluidic chip-mass spectrometry**

Ziyang Guo, Yingqi Zhao, Zhao Jin, Yaran Chang, Xiayan Wang, Guangsheng Guo and Yaoyao Zhao\*



## EDGE ARTICLES

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**Copper-catalyzed remote double functionalization of allenynes**Yulong Song, Chunling Fu, Jian Zheng\*  
and Shengming Ma\*