

# 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.



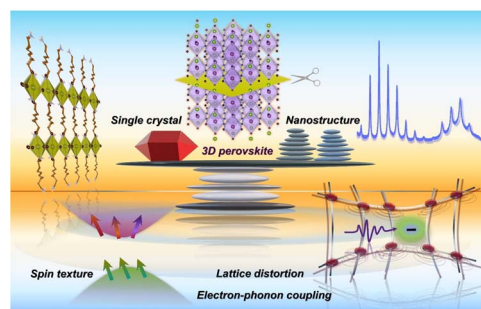
**Inside cover**  
See Michel Rickhaus, Sabine Richert *et al.*, pp. 7515–7523. Image reproduced by permission of Sabine Richert from *Chem. Sci.*, 2024, 15, 7515.

## PERSPECTIVES

7374

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

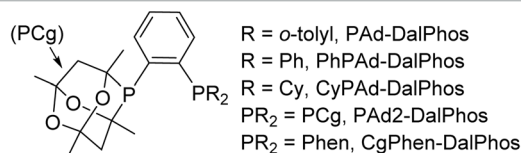
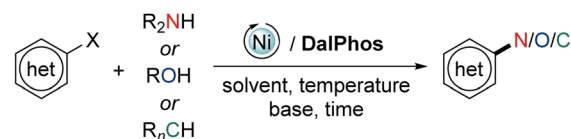
Vishwadeepa Hazra, Arnab Mandal and Sayan Bhattacharyya\*



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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Fundamental questions  
Elemental answers

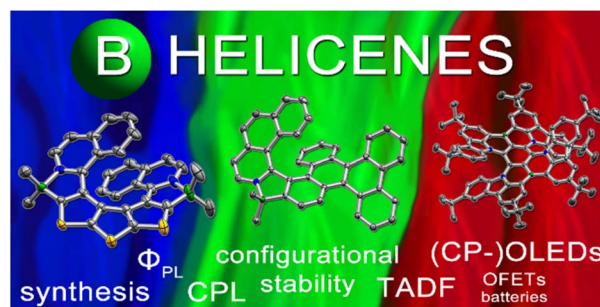


## PERSPECTIVES

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

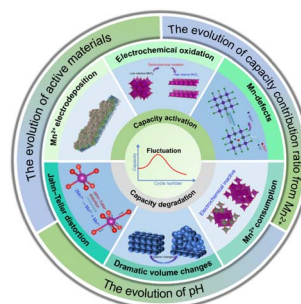


## REVIEWS

7441

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

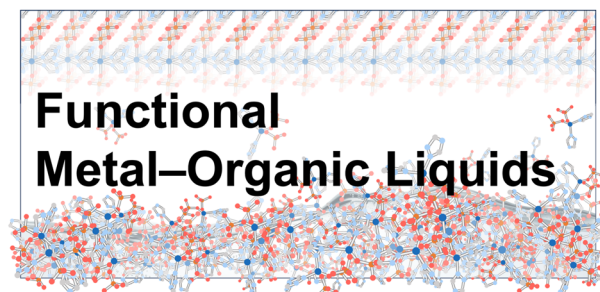
Yanxin Liao, Chun Yang, Jie Bai, Qingqing He, Huayu Wang, Haichao Chen,\* Qichun Zhang\* and Lingyun Chen\*



7474

## Functional metal–organic liquids

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

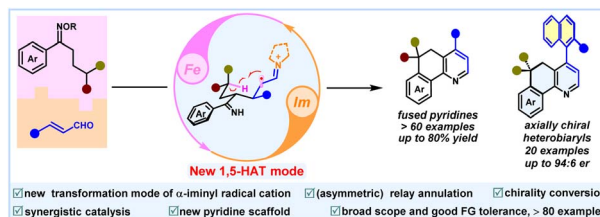


## EDGE ARTICLES

7502

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

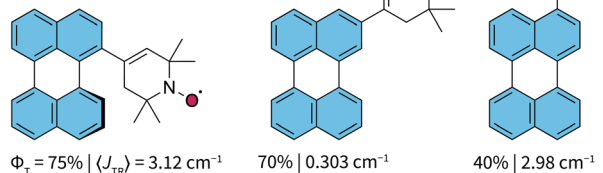
Yu-Qiang Zhou, Kui-Cheng He, Wei-Hao Zheng, Jing-Fang Lv, Shi-Mei He, Ning Yu, Yun-Bo Yang, Lv-Yan Liu, Kun Jiang\* and Ye Wei\*



7515

## A matter of position?

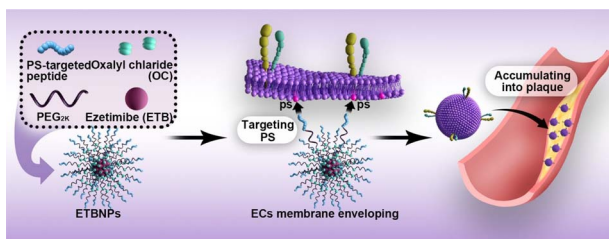
How small  $\pi$ -systems communicate with spins and why it is not as simple as it looks



## 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\*

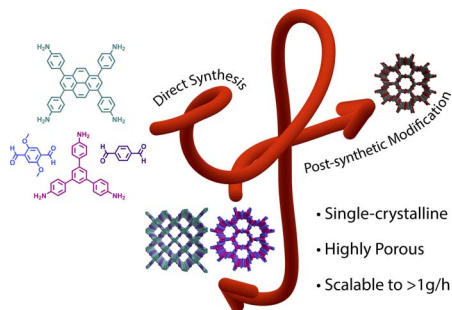
7524



## 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\*

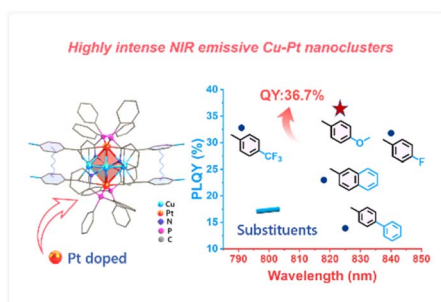
7545



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

Michael Traxler and William R. Dichtel\*

7552



## Highly intense NIR emissive $\text{Cu}_4\text{Pt}_2$ bimetallic clusters featuring Pt(i)- $\text{Cu}_4$ -Pt(i) sandwich kernel

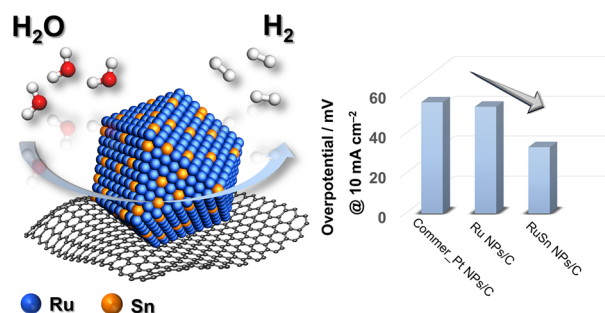
Rui-Ru Zhong, Mo Xie, Cui-Zhou Luan, Lin-Mei Zhang, De-Bo Hao, Shang-Fu Yuan\* and Tao Wu\*



7560

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

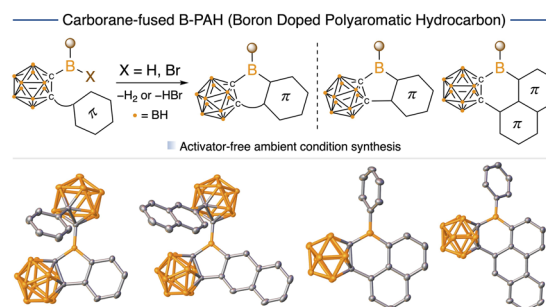
Xin Zhou, Megumi Mukoyoshi,\* Kohei Kusada, Tomokazu Yamamoto, Takaaki Toriyama, Yasukazu Murakami, Shogo Kawaguchi, Yoshiki Kubota, Okkyun Seo, Osami Sakata, Toshiaki Ina and Hiroshi Kitagawa\*



7568

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

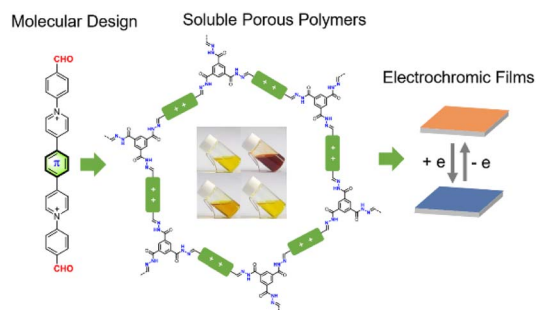
Yijie Li, Masilamani Tamizmani, Manjur O. Akram and Caleb D. Martin\*



7576

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

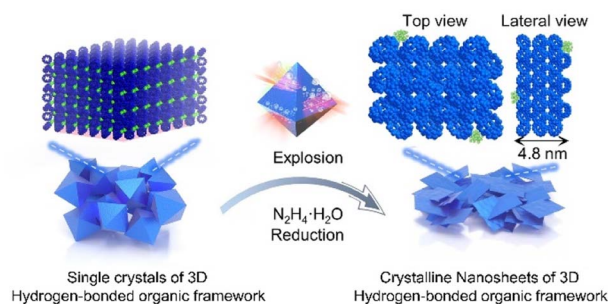
Hongya Miao, Ling Chen, Fangfang Xing, Huijie Li, Thomas Baumgartner\* and Xiaoming He\*



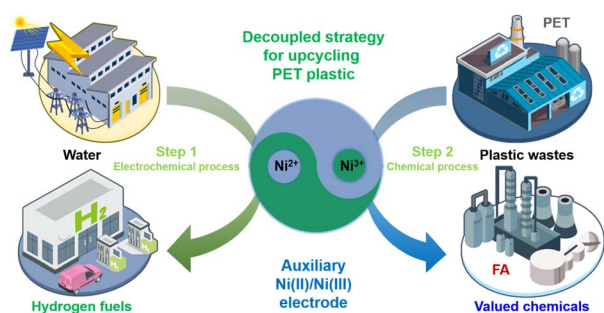
7586

### 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\*



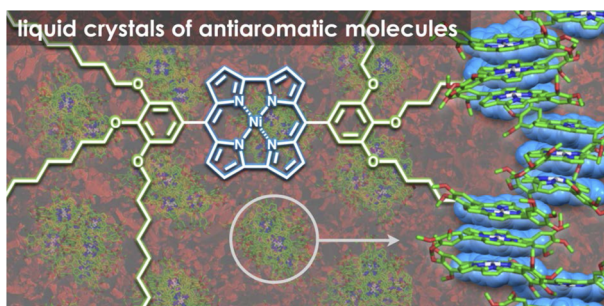
7596



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

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

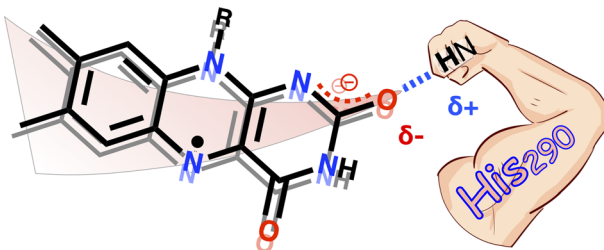
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### Norcorroles as antiaromatic $\pi$ -electronic systems that form dimension-controlled assemblies

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

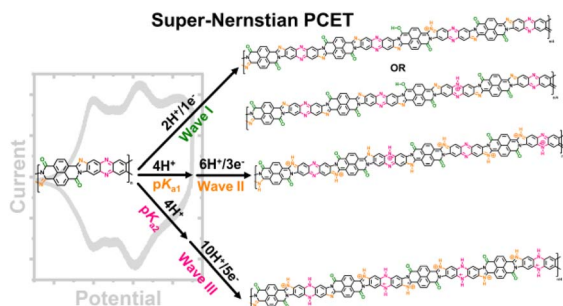
7610



### 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

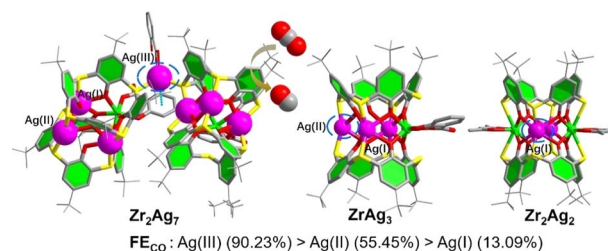
Duyen K. Tran, Sarah M. West, Elizabeth M. K. Speck and Samson A. Jenekhe\*



7643

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

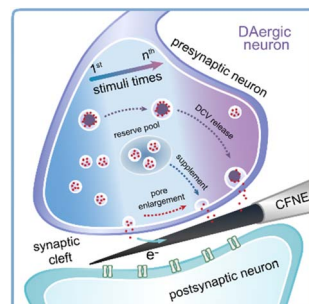
Liang-Jun Li, Wen-Lei Mu, Yi-Qi Tian, Wei-Dong Yu,\*  
Lan-Yan Li,\* Jun Yan and Chao Liu\*



7651

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

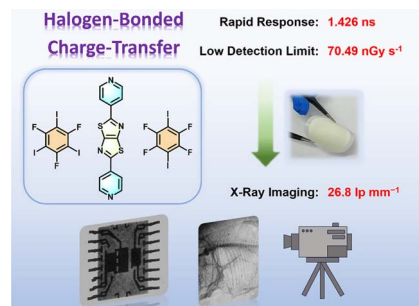
Fu-Li Zhang, Xiao-Ke Yang, Yu-Ting Qi, Si-Yu Tian  
and Wei-Hua Huang\*



7659

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

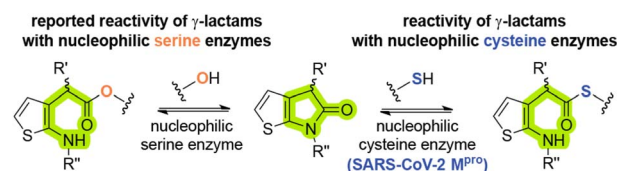
Yu-Hua Chen, Guo-Zhen Zhang, Fu-Hai Chen,  
Shu-Quan Zhang, Xin Fang,\* Hong-Ming Chen\*  
and Mei-Jin Lin\*



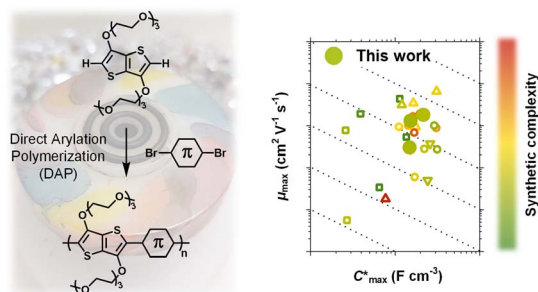
7667

### 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\*



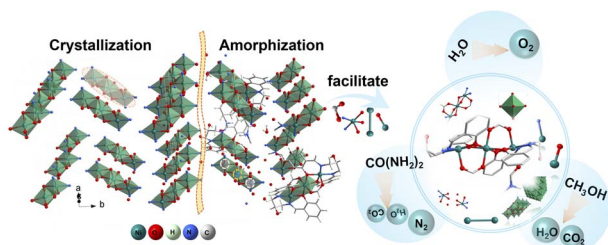
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### High-mobility organic mixed conductors with a low synthetic complexity index via direct arylation polymerization

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

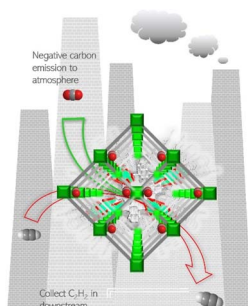
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### Amorphous conversion in pyrolytic symmetric trinuclear nickel clusters trigger trifunctional electrocatalysts

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

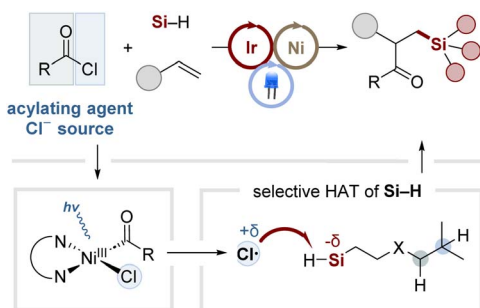
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### An adsorbate biased dynamic 3D porous framework for inverse $\text{CO}_2$ sieving over $\text{C}_2\text{H}_2$

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

7707



### Nickel/photoredox-catalyzed three-component silylacetylation of acrylates via chlorine photoelimination

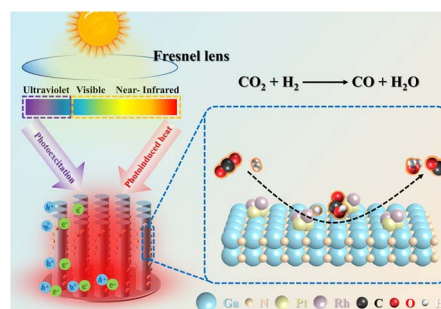
Yejin Koo and Sungwoo Hong\*



7714

### Photo-thermal synergistic CO<sub>2</sub> hydrogenation towards CO over PtRh bimetal-decorated GaN nanowires/Si

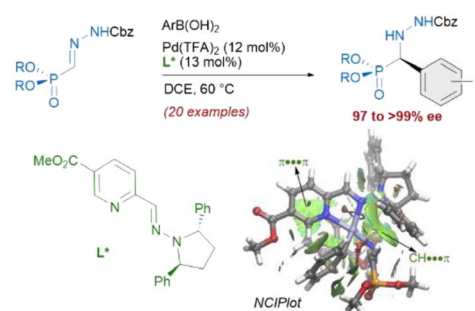
Jinglin Li, Bowen Sheng, Liang Qiu, Jiajia Yang, Ping Wang,\* Yixin Li, Tianqi Yu, Hu Pan, Ying Li, Muhan Li, Lei Zhu,\* Xinqiang Wang,\* Zhen Huang and Baowen Zhou\*



7725

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

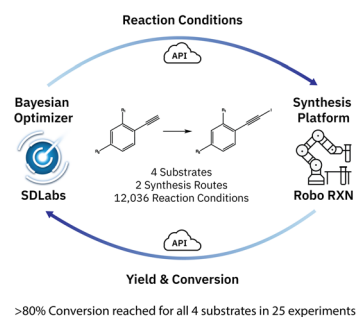
Saúl Alberca, Javier Romero-Parra, Israel Fernández,\* Rosario Fernández,\* José M. Lassaletta\* and David Monge\*



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

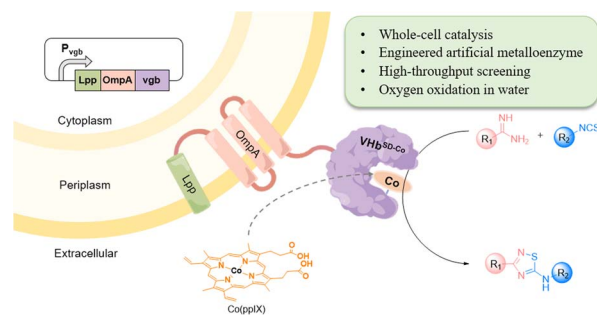
Oliver Schilter,\* Daniel Pacheco Gutierrez, Linnea M. Folkmann, Alessandro Castrogiovanni, Alberto García-Durán, Federico Zipoli, Loïc M. Roch and Teodoro Laino



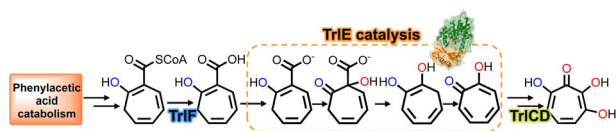
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### Directed evolution of *Escherichia coli* surface-displayed *Vitreoscilla* hemoglobin as an artificial metalloenzyme for the synthesis of 5-imino-1,2,4-thiadiazoles

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



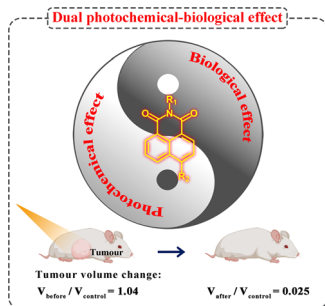
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### Biosynthesis of the bacterial antibiotic 3,7-dihydroxytropolone through enzymatic salvaging of catabolic shunt products

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

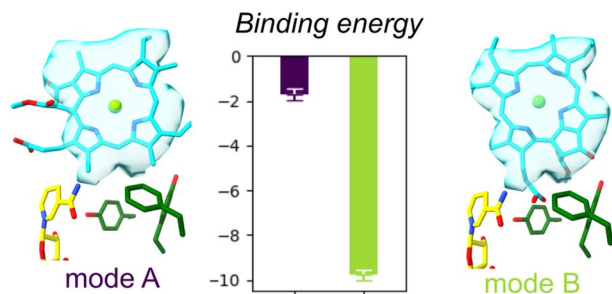
7757



### 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\*

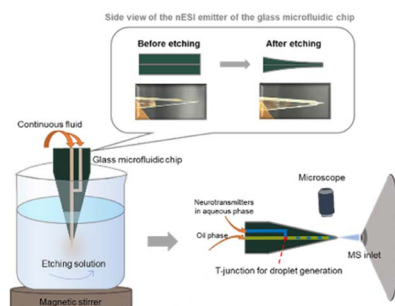
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### Elucidating substrate binding in the light-dependent protochlorophyllide oxidoreductase

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\*



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## Copper-catalyzed remote double functionalization of allenyne

Yulong Song, Chunling Fu, Jian Zheng\* and Shengming Ma\*

