

# Green Chemistry

Cutting-edge research for a greener sustainable future

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### Cover

See Javier Pérez-Ramírez, Gonzalo Guillén-Gosálbez *et al.*, pp. 6603–6611.

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# Green Chemistry

Cutting-edge research for a greener sustainable future

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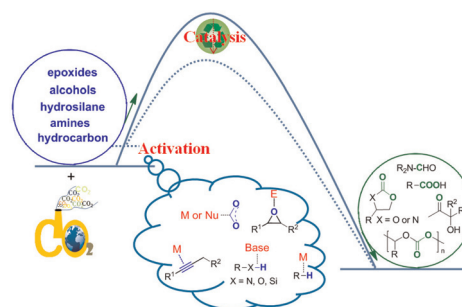


## CRITICAL REVIEWS

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Recent progress in CO<sub>2</sub> conversion into organic chemicals by molecular catalysis

Qing-Wen Song,\* Ran Ma, Ping Liu, Kan Zhang and Liang-Nian He\*

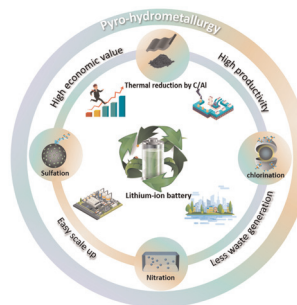


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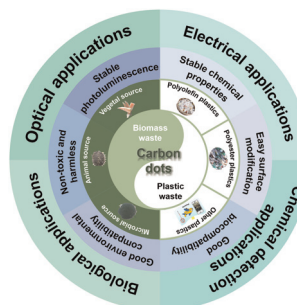
Minyu He, Xi Jin, Xiaogang Zhang, Xinxi Duan, Pengyang Zhang, Liumei Teng, Qingcai Liu and Weizao Liu\*



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## Functional carbon dots derived from biomass and plastic wastes

Tairong Kuang,\* Mengyao Jin, Xinrui Lu, Tong Liu, Henri Vahabi, Zhipeng Gu and Xiao Gong\*

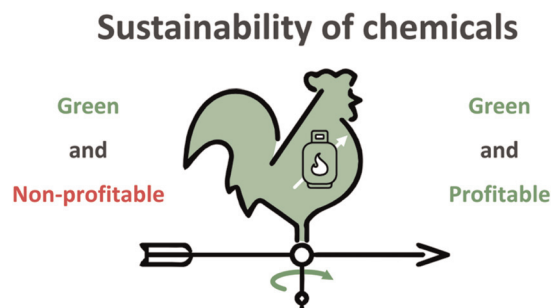


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## Energy crisis in Europe enhances the sustainability of green chemicals

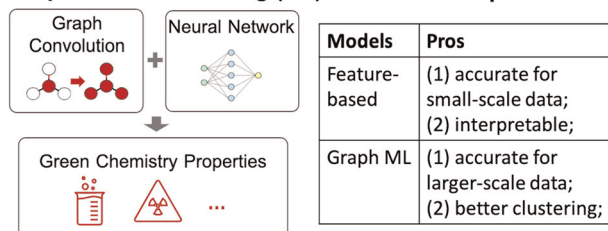
Abhinandan Nabera, Ioan-Robert Istrate, Antonio José Martín, Javier Pérez-Ramírez\* and Gonzalo Guillén-Gosálbez\*



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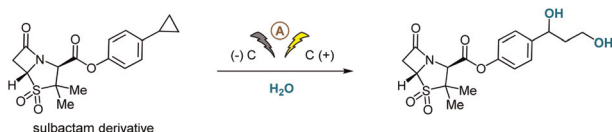
## Graph Machine Learning (ML) Model Comparison



## Improved environmental chemistry property prediction of molecules with graph machine learning

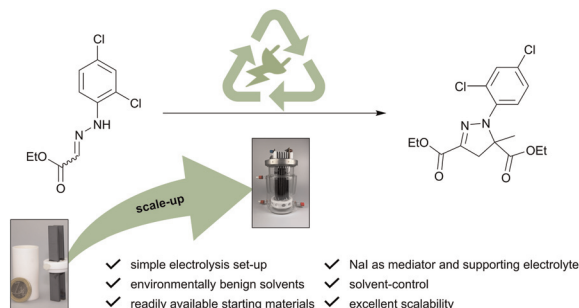
Shang Zhu, Bichlien H. Nguyen, Yingce Xia, Kali Frost, Shufang Xie, Venkatasubramanian Viswanathan and Jake A. Smith\*

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Jianhua Cai, Yuxi Wen, Wei Sheng, Xuejin Huang, Ye Zheng, Chunlan Song\* and Jiakun Li\*

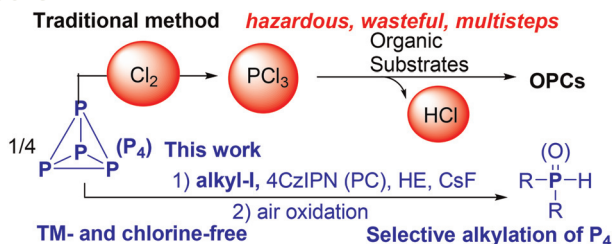
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## From screening to the hectogram scale: sustainable electrochemical synthesis of mefenpyr-diethyl

Martin Linden, Silja Hofmann, Felix N. Weber, Robin M. Bär, Sherif J. Kaldas, Mark J. Ford and Siegfried R. Waldvogel\*

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## Metal-free visible-light-induced phosphorylation of unactivated alkyl iodides with white phosphorus as the P-atom source

Fushan Chen, Jialiang Peng, Yue Ying, Yinwei Cao, Pengxiang Xu,\* Guo Tang\* and Yufen Zhao

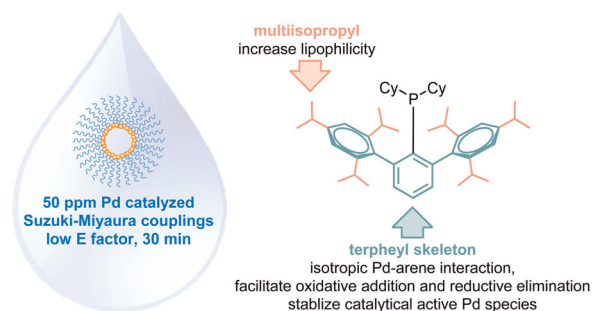


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Lei Zhang, Wenbo Hu, Heng Li, Jicheng Shi\* and Bingxin Yuan\*



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### Low-carbon recycling of spent lithium iron phosphate batteries via a hydro-oxygen repair route

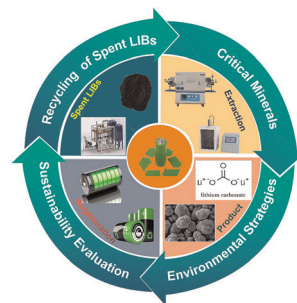
Kang Liu, Junxiong Wang, Mengmeng Wang, Qiaozhi Zhang, Yang Cao, Longbin Huang, Marjorie Valix and Daniel C. W. Tsang\*



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### Stepwise recycling of valuable metals from spent lithium-ion batteries based on *in situ* thermal reduction and ultrasonic-assisted water leaching

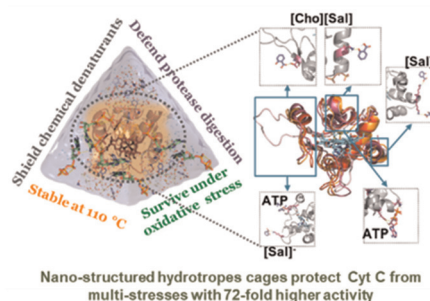
Wei Ding, Shenxu Bao,\* Yimin Zhang, Liuyi Ren, Chunfu Xin, Bo Chen, Bo Liu, Junhui Xiao and Xiaochuan Hou



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### Nano-structured hydrotrope-caged cytochrome c with boosted stability in harsh environments: a molecular insight

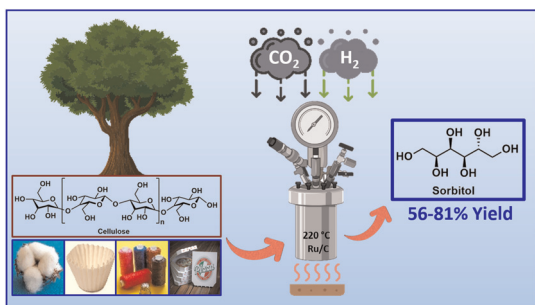
Pranav Bharadwaj, Dheeraj Kumar Sarkar, Meena Bisht, Sachin M. Shet, Nataraj Sanna Kotrappanavar, Veeresh Lokesh, Gregory Franklin,\* Jan Brezovsky\* and Dibyendu Mondal\*





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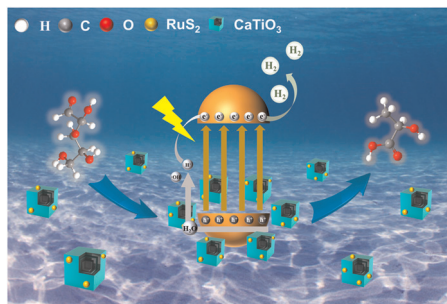
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Kseniia Titenkova, Alexander D. Shuvaev, Fedor E. Teslenko, Egor S. Zhilin and Leonid L. Fershtat\*

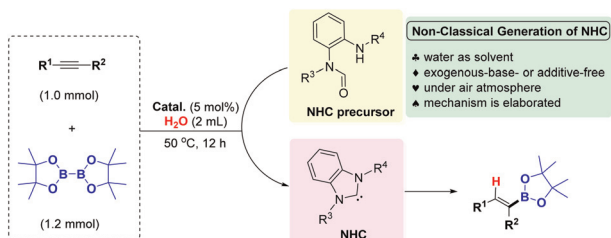
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### Anchoring $\text{RuS}_2$ on a multi-shelled hollow cube of $\text{CaTiO}_3$ for ultrahigh hydrogen evolution with the assistance of a photocatalytic biorefinery

Xinze Li, Jiliang Ma,\* Rui Cui, Junqiang Zhang, Zhendong Liu and Runcang Sun\*

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### Aqueous hydroboration of alkynes via nonclassical generation of $\text{N}$ -heterocyclic carbenes

Sheng Tao, Yang Wang, Qianxiu Pan, Jixing Zhao, Qingqing Bu, Fei Chen, Jichang Liu, Bin Dai,\* Donghui Wei\* and Ning Liu\*

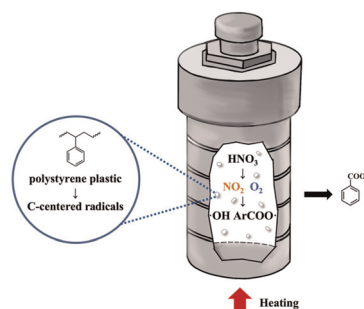


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Xi Luo, Jiahui Zhan, Qingqing Mei\* and Shicheng Zhang\*



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### Three-component reaction for the synthesis of imides enabled by electrochemical C(sp<sup>3</sup>)-H functionalization

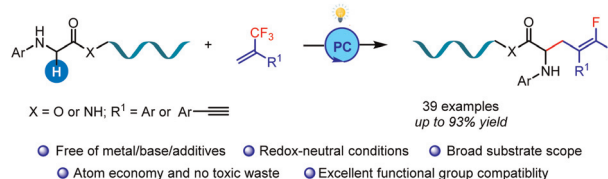
Qiao Chu, Zhaoyue Feng, Sumin Zhang, Ping Liu\* and Peipei Sun\*



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### Metal-free, visible-light driven $\alpha$ -C(sp<sup>3</sup>)-H gem-difluoroallylation of glycine derivatives with trifluoromethyl alkenes and 1,3-enynes

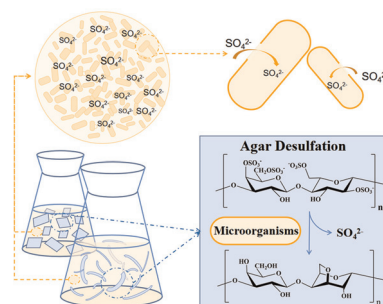
Zi-Hang Yuan, Hong Xin, Lu Zhang, Pin Gao, Xu Yang, Xin-Hua Duan and Li-Na Guo\*



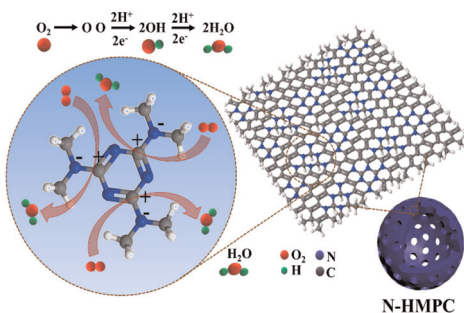
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### Quality improvement of agar through desulfation with microorganisms

Yang Song, Meixian Wu, Zhen Liu,\* Mengjiao Yu, Francesco Secundo and Xiangzhao Mao\*



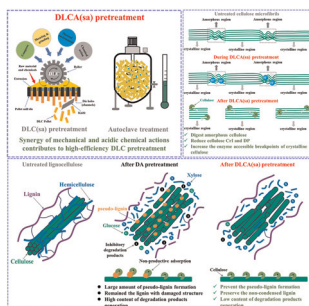
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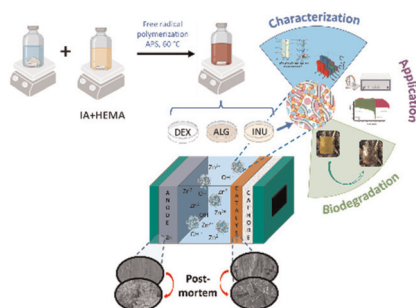
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### Expanding the circularity of plastic and biochar materials by developing alternative low environmental footprint sensors

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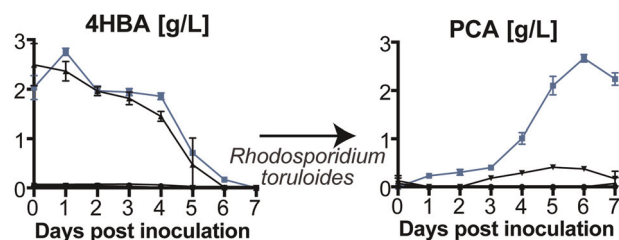


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### Enhanced microbial production of protocatechuate from engineered sorghum using an integrated feedstock-to-product conversion technology

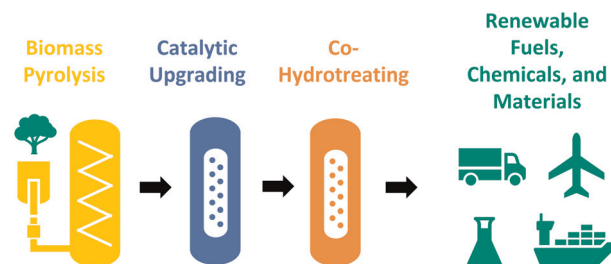
Valentina E. Garcia, Venkataramana Pidatala, Carolina A. Barcelos, Dupeng Liu, Peter Otoupal, Oliver Wendt, Hemant Choudhary, Ning Sun, Aymerick Eudes, Eric R. Sundstrom, Henrik V. Scheller, Daniel H. Putnam, Aindrila Mukhopadhyay, John M. Gladden, Blake A. Simmons and Alberto Rodriguez\*



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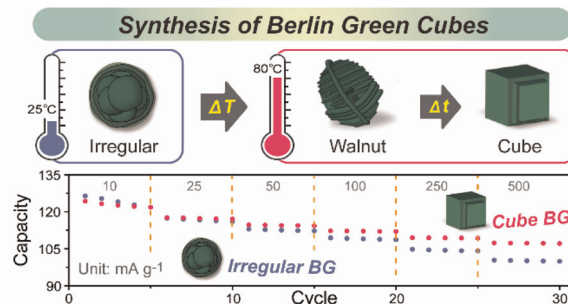
Matthew M. Yung, Calvin Mukarakate, Kristiina Iisa, A. Nolan Wilson, Mark R. Nimlos, Susan E. Habas, Abhijit Dutta, Kinga A. Unocic, Joshua A. Schaidle and Michael B. Griffin\*



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### Turning Berlin green frameworks into cubic crystals for cathodes with high-rate capability

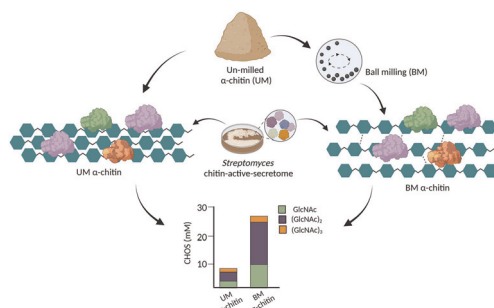
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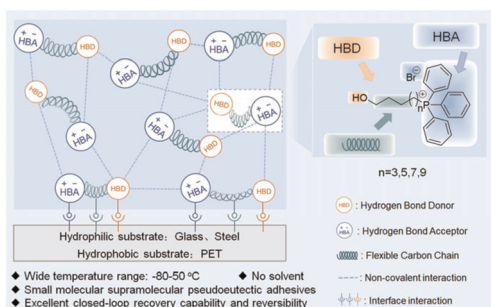
### Improving the efficiency and sustainability of chitin bioconversion through a combination of *Streptomyces* chitin-active-secretomes and mechanical-milling

Lal Duhsaki, Saumashish Mukherjee and Jogi Madhuprakash\*



## PAPERS

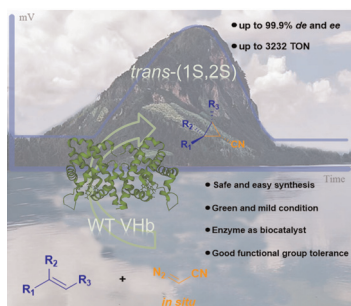
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### Recoverable solvent-free small molecular supramolecular pseudoeutectic adhesives with a wide temperature range

Mingyi Li, Chenyang Xie, Feng Li, Xingzong Wang, Shiru Wang, Zhihui Qin,\* Tifeng Jiao\* and Jingyue Yang\*

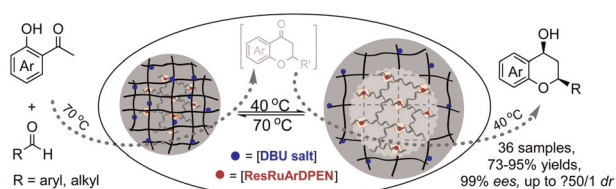
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### Vitreoscilla hemoglobin: a natural carbene transfer catalyst for diastereo- and enantioselective synthesis of nitrile-substituted cyclopropanes

Hanqing Xie, Fengxi Li, Yaning Xu, Chunyu Wang, Yuelin Xu, Junhao Wu, Zhengqiang Li,\* Zhi Wang\* and Lei Wang\*

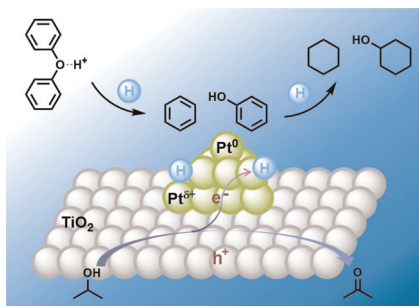
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### Harmonization of an incompatible aqueous aldol condensation/oxa-Michael addition/reduction cascade process over a core-shell-structured thermoresponsive catalyst

Yu Su, Chengyi Wang, Qipeng Chen, Yuanli Zhu, Shaomin Deng, Shoujin Yang, Ronghua Jin and Guohua Liu\*

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### Photocatalytic transfer hydrogenolysis of aryl ethers

Zhikun Peng, Zhixi Wu, Xiaotong Sun and Hongji Li\*

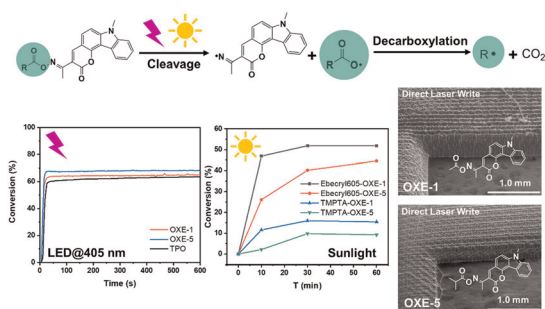


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### Carbazole-fused coumarin based oxime esters (OXEs): efficient photoinitiators for sunlight driven free radical photopolymerization

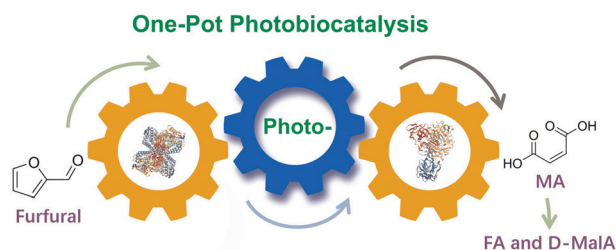
Yijun Zhang, Zheng Liu, Timur Borjigin, Bernadette Graff, Fabrice Morlet-Savary, Michael Schmitt, Didier Gigmes, Frédéric Dumur\* and Jacques Lalevée\*



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### One-pot photoenzymatic synthesis of maleic acid and its derivatives from bio-based furfural *via* catalytic cascades

Si-Mou Zou, Jian-Peng Wang, Min-Hua Zong, Zhi-Lin Wang,\* Zhao-Juan Zheng and Ning Li\*



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### Magnetic hollow micro-sized nanoaggregates for synergistically accelerating PET glycolysis

Ling-Xia Yun, Yan Wei, Qian Sun, Yu-Ting Li, Bin Zhang, Hang-Tian Zhang,\* Zhi-Gang Shen and Jie-Xin Wang\*

