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See Helen F. Sneddon *et al.*, pp. 9697–9711.

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See Volker Hessel, Marc Escribà-Gelonch *et al.*, pp. 9503–9528.

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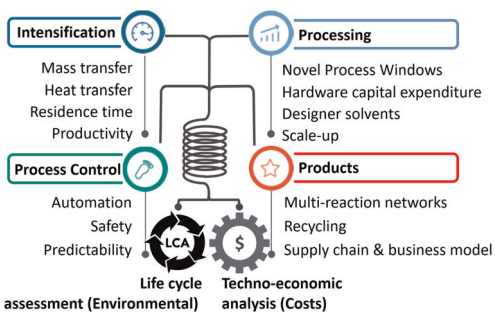
CRITICAL REVIEWS

9503

Sustainability of flow chemistry and microreaction technology

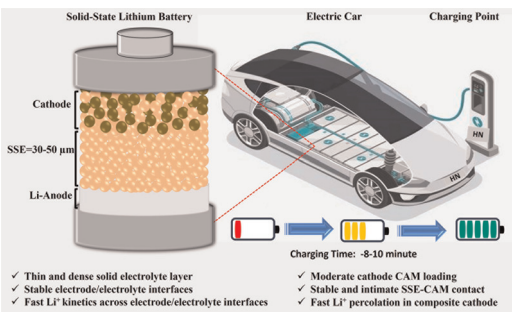
Volker Hessel,* Sampurna Mukherjee, Sutanuka Mitra, Arunava Goswami, Nam Nghiep Tran, Francesco Ferlin, Luigi Vaccaro, Fariba Malekpour Galogahi, Nam-Trung Nguyen and Marc Escribà-Gelonch*



9529

Key challenges and advancements toward fast-charging all-solid-state lithium batteries

Niaz Ahmad, Cailing Fan, Muhammad Faheem, Xiaoxiao Liang, Yirong Xiao, Xinting Cao, Chaoyuan Zeng,* Qinxi Dong and Wen Yang*



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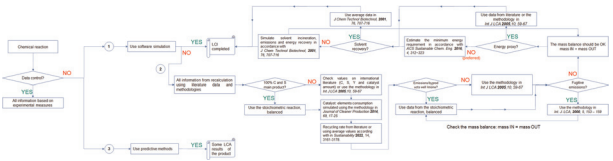
CRITICAL REVIEWS

9554

Procedural life cycle inventory of chemical products at laboratory and pilot scale: a compendium

Daniele Cespi

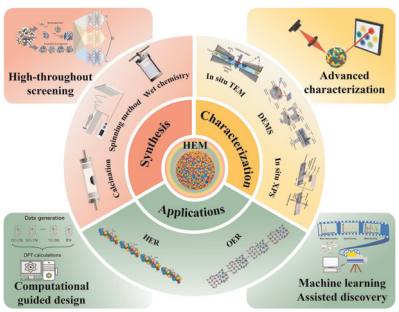


TUTORIAL REVIEWS

9569

High entropy materials: potential catalysts for electrochemical water splitting

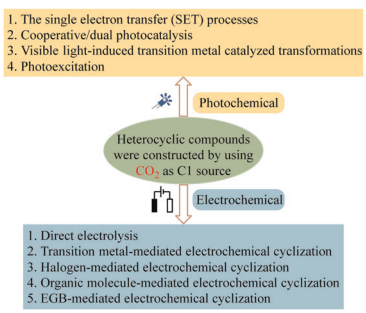
Zhong Wang, Xinjia Tan, Ziyu Ye, Shiyu Chen, Guojian Li, Qiang Wang* and Shuang Yuan*



9599

Advances in photochemical/electrochemical synthesis of heterocyclic compounds from carbon dioxide

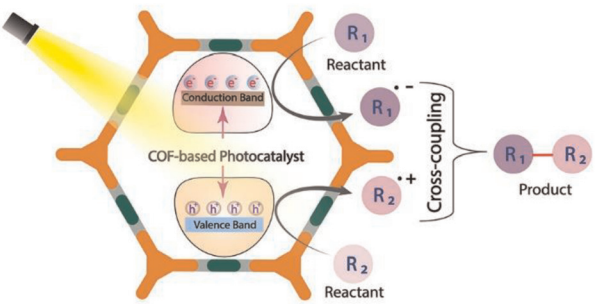
Yu-Yang Xie and Ying-Ming Pan*



9619

Covalent organic frameworks as heterogeneous photocatalysts for cross-coupling reactions

Avanti Chakraborty, Monojit Roy, Akhtar Alam,* Debashis Adhikari* and Pradip Pachfule*



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TUTORIAL REVIEWS

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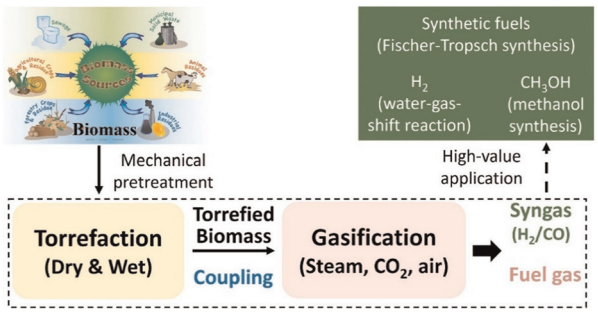

Progress in torrefaction pretreatment for biomass gasification

Quanhui Zhou, Yafei Shen* and Xuehong Gu

COMMUNICATIONS

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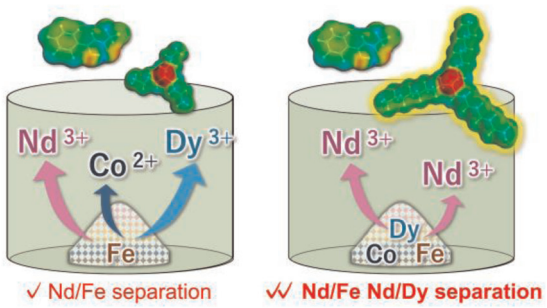
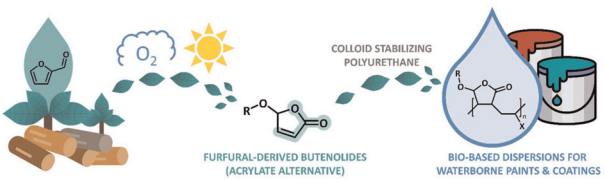


Improved separation of rare earth elements using hydrophobic deep eutectic solvents: liquid–liquid extraction to selective dissolution

Takafumi Hanada,* Nicolas Schaeffer, Masahiro Katoh, Joao A. P. Coutinho and Masahiro Goto*

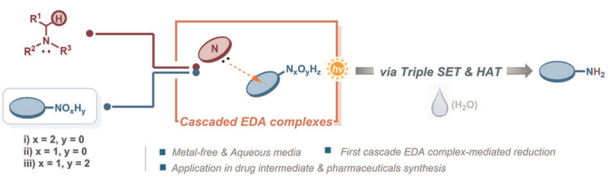
9676



Waterborne polymers and coatings from bio-based butenolides

Andries Jensma, Niels Elders,* Keimpe J. van den Berg and Ben L. Feringa*

9682



Light-fuelled nitro-reduction *via* cascaded electron donor–acceptor complexes in aqueous media

Xiaohui Zhuang, Haijing Song, Jiayin Wang, Zhaokang Zhang, Jiayang Wang, Bin Sun,* Weike Su and Can Jin*

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COMMUNICATIONS

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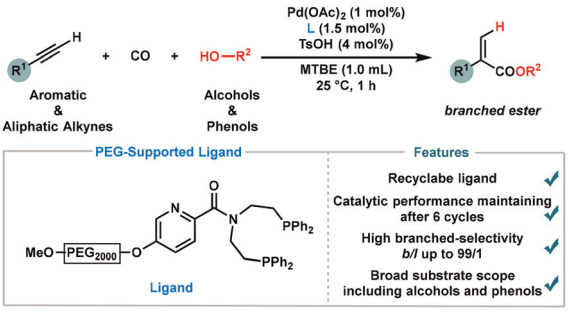
Recyclable picolinamide-derived ligand-controlled branched-selective hydroesterification of alkynes with alcohols and phenols

Ding Liu, Luyun Zhang, Jiaxin Cheng, Qiuxiang Wei, Zhenhua Jia* and Fen-Er Chen*



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Development of a solvent sustainability guide for the paints and coatings industry

Laura Pilon, Daniel Day, Harry Maslen, Oliver P. J. Stevens, Nicola Carslaw, David R. Shaw and Helen F. Sneddon*

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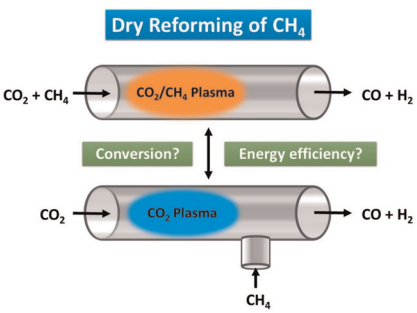
Can post-plasma CH_4 injection improve plasma-based dry reforming of methane? A modeling study

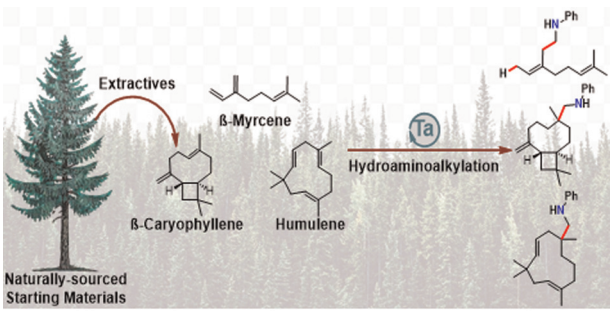
Matthias Albrechts,* Ivan Tsonev and Annemie Bogaerts



9729

Exploiting natural complexity for substrate controlled regioselectivity and stereoselectivity in tantalum catalysed hydroaminoalkylation

Cameron H. M. Zheng, Ben E. Nadeau, Heather L. Trajano* and Laurel L. Schafer*



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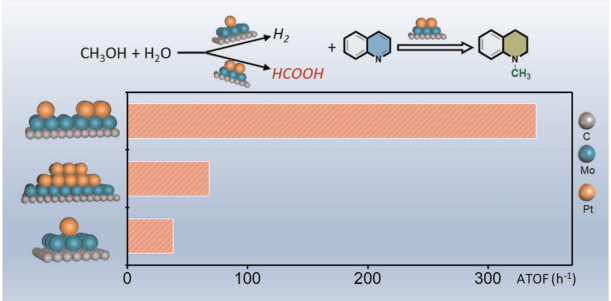
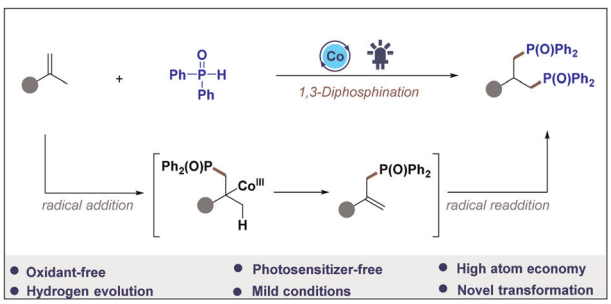


Additive-free *N*-methylation reaction synergistically catalyzed by Pt single atoms and clusters on α-MoC using methanol as a sustainable C1 source

Shurui Fan, Mingyuan Zhang, Xiangxin Jin, Zirui Gao, Yao Xu, Maolin Wang, Chuqiao Song, Houhong Song, Xiangxiang Chen, Rulong Ma, Siyu Yao, Rui Gao,* Xiaonian Li* and Lili Lin*

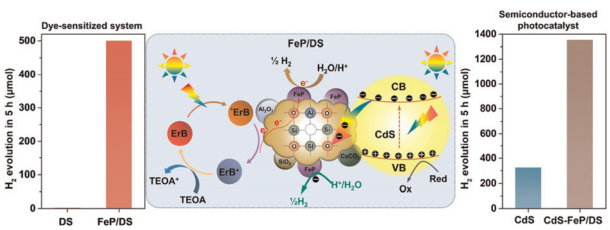
9749



Visible light-induced cobalt-catalyzed 1,3-diphosphination of alkenes

Wenlong Shan, Zemin Wang, Chenxia Gao, Xiaowei Li, Wenli Zhuang, Ruihua Liu, Cong Shi, Hongyun Qin, Xiangqian Li and Dayong Shi*

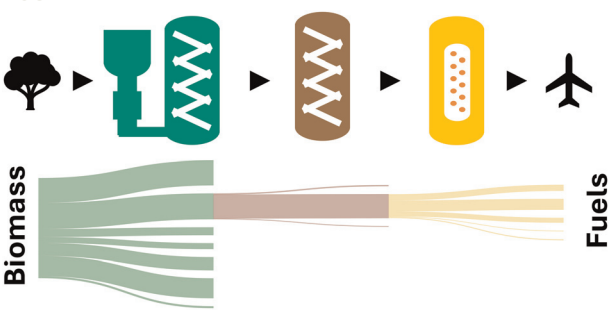
9757



Triggering inert desert sand toward a low-cost and efficient cocatalyst for photocatalytic hydrogen evolution reactions

Junqing Wang, Fang Wang, Zhengguo Zhang and Shixiong Min*

9768



Opening pathways for the conversion of woody biomass into sustainable aviation fuel *via* catalytic fast pyrolysis and hydrotreating

Michael B. Griffin,* Kristiina Iisa, Abhijit Dutta, Xiaolin Chen, Cody J. Wrasman, Calvin Mukarakate, Matthew M. Yung, Mark R. Nimlos, Luke Tuxworth, Xavier Baucherel, Steven M. Rowland and Susan E. Habas

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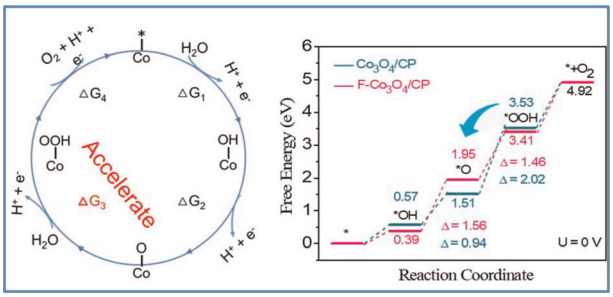
9782

Trace F-doped Co_3O_4 nanoneedles for enhanced acidic water oxidation activity *via* promoting OH coverage

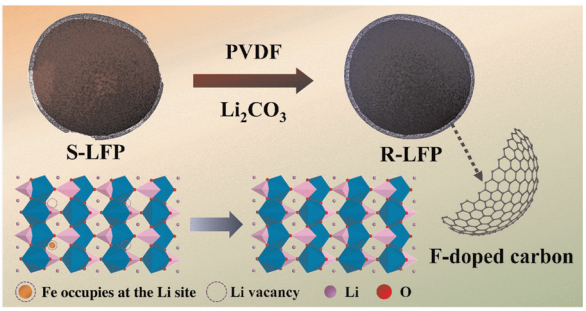
Genyan Hao, Tao Zhao, Qiang Fang, Yunzhen Jia, Dandan Li, Dazhong Zhong,* Jinping Li and Qiang Zhao*



9791

Direct regeneration of fluorine-doped carbon-coated $LiFePO_4$ cathode materials from spent lithium-ion batteries

Yurong Han, Yinzhuang Fang, Menglong Yan, Haoyu Qiu, Yifeng Han, Yi Chen, Liangyou Lin, Jingwen Qian, Tao Mei and Xianbao Wang*



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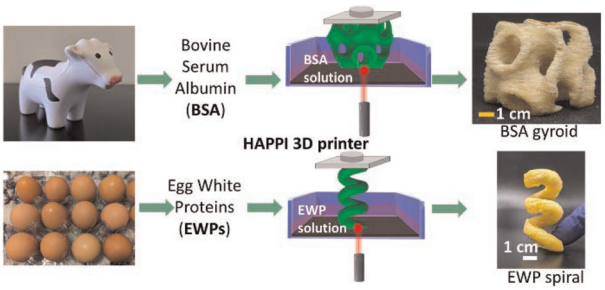
Directional glycolysis of waste PET using deep eutectic solvents for preparation of aromatic-based polyurethane elastomers

Fei Li, Xiaoqian Yao, Rong Ding, Yinan Bao, Qing Zhou,* Dongxia Yan, Yi Li, Junli Xu, Jiayu Xin and Xingmei Lu*

9814

Additive manufacturing *via* protein denaturation

Chang-Uk Lee, Sung June Kim, Rachel B. Dietrich, Audrey L. Girard and Andrew J. Boydston*



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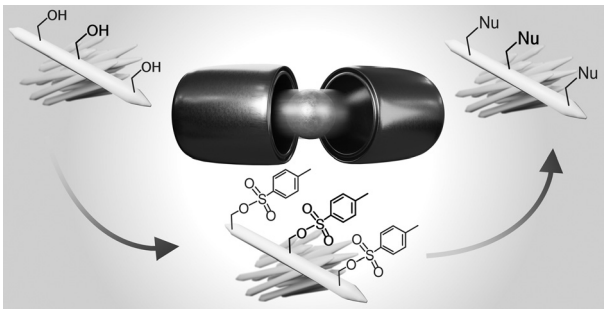
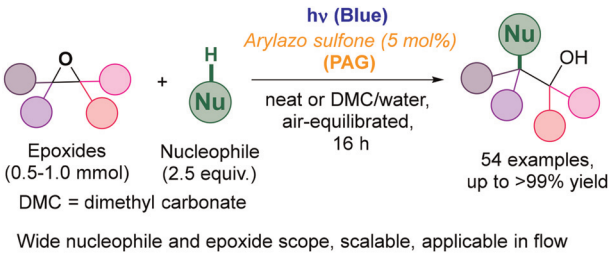


Mechanochemical modification of cellulose nanocrystals by tosylation and nucleophilic substitution

Daniel Langerreiter, Nashwa L. Attallah, Inge Schlapp-Hackl, Mauri A. Kostiainen* and Sandra Kaabel*

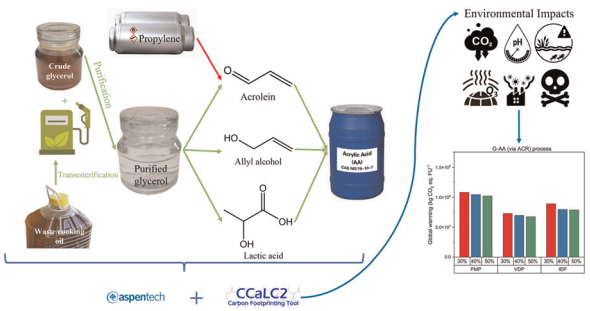
9833



Visible photons for the regioselective nucleophilic ring opening of epoxides

Beatrice Bernardoni, Lorenzo Di Terlizzi,* Eirini M. Galathri, Christoforos G. Kokotos, Maurizio Fagnoni* and Stefano Protti

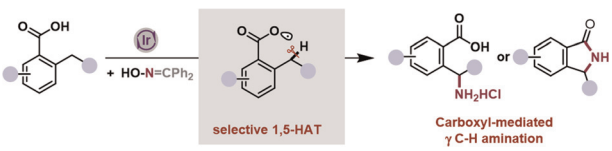
9840



Environmental sustainability evaluation of glycerol and propylene-based pathways to acrylic acid *via* different intermediates

Yash Bansod, Prashant Pawanipagar, Kamran Ghasemzadeh and Carmine D'Agostino*

9859



Radical cascade synthesis of γ-amino acids or γ-lactams *via* carboxyl-mediated intramolecular C–H amination

Tao Huang, Can Liu, Pan-Feng Yuan, Tao Wang, Biao Yang, Yao Ma and Qiang Liu*

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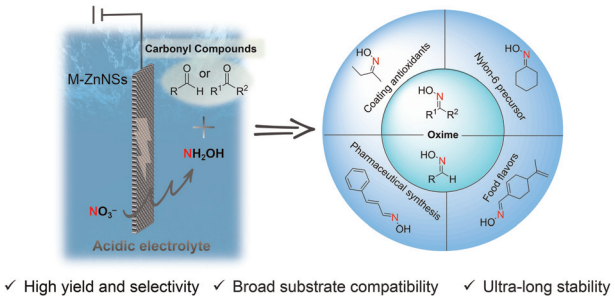
Highly efficient electrosynthesis of oximes from nitrates and carbonyl compounds in acidic media

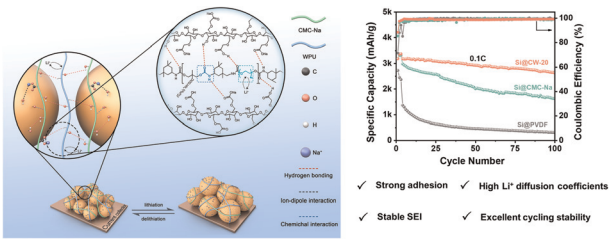
Cheng Xue, Shuaiqiang Jia,* Jiapeng Jiao, Xiao Chen, Zhanghui Xia, Mengke Dong, Ting Deng, Hailian Cheng, Chunjun Chen, Haihong Wu,* Mingyuan He and Buxing Han*



9874

A water-soluble binder in high-performance silicon-based anodes for lithium-ion batteries based on sodium carboxymethyl cellulose and waterborne polyurethane

Xingshen Sun, Xiangyu Lin, Yong Wen, Fuhao Dong, Lizhen Guo, Zhanqian Song, Zitao Yang, He Liu, Xuequan Li,* Xu Xu* and Hongxiao Wang*



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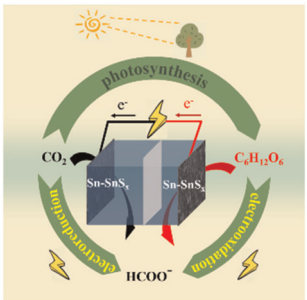
Construction of a self-supporting bifunctional Sn–SnS_x electrocatalyst *via* one-step electrodeposition for formate production from coupled CO_2 reduction and glucose oxidation

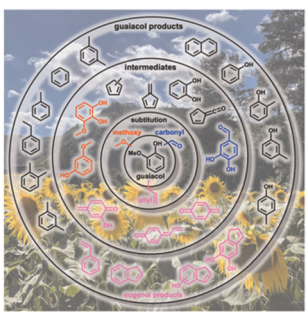
Chongyan Chen, Shuguang Shen,* Jie Wang, Yongmei Liu, Xingting Guo, Lili Zhang and Jing Li



9899

Catalytic pyrolysis mechanism of lignin moieties driven by aldehyde, hydroxyl, methoxy, and allyl functionalization: the role of reactive quinone methide and ketene intermediates

Zeyou Pan, Xiangkun Wu, Andras Bodi, Jeroen A. van Bokhoven and Patrick Hemberger*



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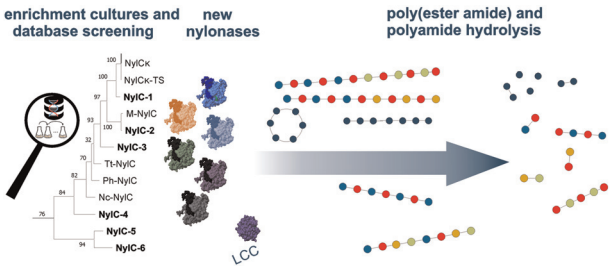

Increasing the diversity of nylonases for poly(ester amide) degradation

Jan de Witt, Maike-Elisa Ostheller, Kenneth Jensen, Christian A. M. R. van Slagmaat, Tino Polen, Gunnar Seide, Stephan Thies, Benedikt Wynands and Nick Wierckx*

CORRECTION

9923

Correction: An eco-friendly one-pot extraction process for curcumin and its bioenhancer, piperine, from edible plants in exosome-like nanovesicles

Meghana N. Kumar, Sreeram Peringattu Kalarikkal, Cathrine M. S. Bethi, Sukriti Narendra Singh, Janakiraman Narayanan and Gopinath M. Sundaram*

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