

RSC Sustainability

rsc.li/rscsus

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 2753-8125 CODEN RSSUAN 2(5) 1167–1622 (2024)



Cover

See Michael M. Lerch, Ben L. Feringa *et al.*, pp. 1300–1336. Image reproduced by permission of A. Guinart and T. Freese from *RSC Sustainability.*, 2024, 2, 1300.



Inside cover

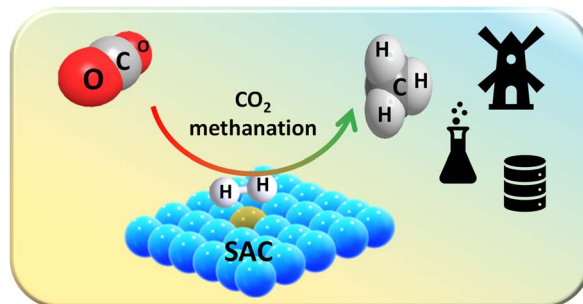
See Iseult Lynch *et al.*, pp. 1378–1399. Image reproduced by permission of Iseult Lynch from *RSC Sustainability.*, 2024, 2, 1378.

CRITICAL REVIEWS

1179

Recent advances in CO₂ hydrogenation to methane using single-atom catalysts

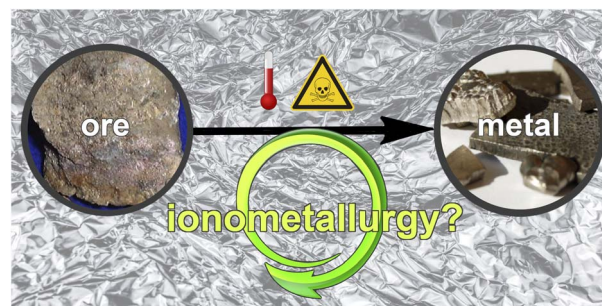
Neha Choudhary, Kallayi Nabeela, Nirmitya Mate and Shaikh M. Mobin*



1202

Ionometallurgy: an academic exercise or promising approach?

Janine Richter and Michael Ruck*



Advance your career in science

with professional recognition that showcases
your **experience, expertise and dedication**

Stand out from the crowd

Prove your commitment
to attaining excellence in
your field

Gain the recognition you deserve

Achieve a professional
qualification that inspires
confidence and trust

Unlock your career potential

Apply for our professional
registers (RSci, RSciTech)
or chartered status
(CChem, CSci, CEnv)

Apply now

rsc.li/professional-development



CRITICAL REVIEWS

1215

Electrophilic aromatic substitution in eutectic-type mixtures: from an old concept to new sustainable horizons

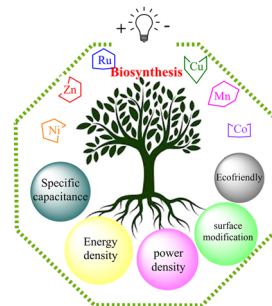
Tatiana Martí, Xavier Marset,* Celia Guillem, Diego J. Ramón and Gabriela Guillena*

Sustainable S_EAr in Eutectic-type Mixtures

1224

Green supercapacitors: review and perspectives on sustainable template-free synthesis of metal and metal oxide nanoparticles

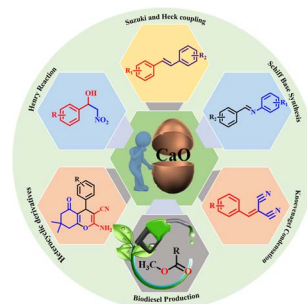
Jayaprakash Meena, Shapna shankari Sivasubramaniam, Ezhumalai David and Santhakumar K*



1246

Biogenic derived egg shell and its derivatives as solid base heterogeneous catalysts for organic transformations: a comprehensive review

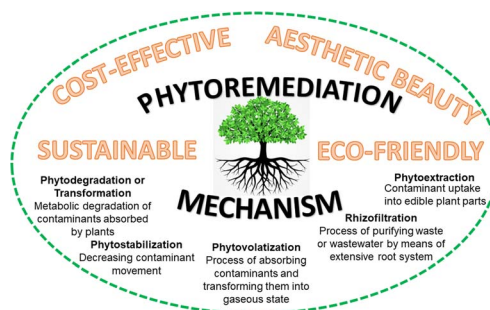
Nagaraj S. Naik,* Swathi Divakar, Jyothi M. S., Srinivasa Budagumpi, R. Geetha Balakrishna and Mahesh Padaki*



1269

Phytoremediation as a green and sustainable prospective method for heavy metal contamination: a review

Md. Merajul Islam,* Neha Saxena and Deepa Sharma



TUTORIAL REVIEW

1289



The Sea's best kept secret: the use of seaweed as a source of biohydrogen for clean and renewable energy

Olivia M. Wyper, Sohrab Zendejboudi and Francesca M. Kerton*

PERSPECTIVES

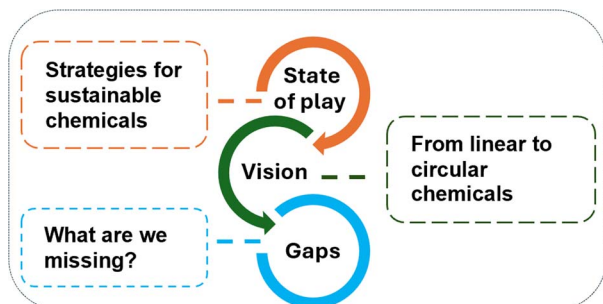
1300



The relevance of sustainable laboratory practices

Thomas Freese, Nils Elzinga, Matthias Heinemann, Michael M. Lerch* and Ben L. Feringa*

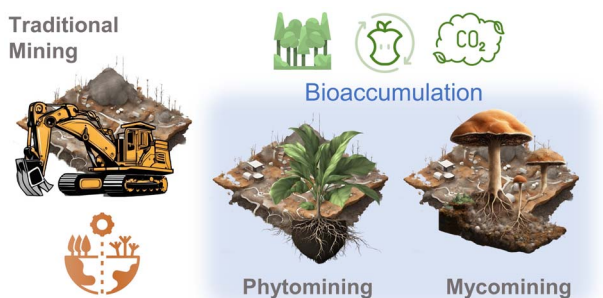
1337



The pathway to net zero: a chemicals perspective

Matthew Royle, Benoît Chachuat, Bing Xu and Elizabeth A. Gibson*

1350



Mycomining: perspective on fungi as scavengers of scattered metal, mineral, and rare earth element resources

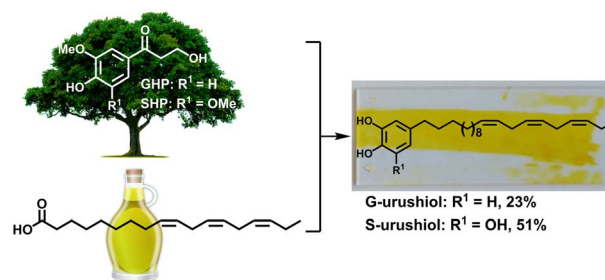
Mitchell P. Jones* and Alexander Bismarck*



1358

Synthetic urushiols from biorenewable carbon resources: chemical conversion of enzymatic degradation products of wood lignin to an ancient yet future coating material

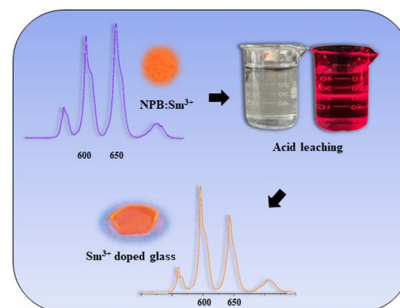
Katsuhiro Isozaki,* Hiroshi Matsuda, Ryosuke Agata, Jaeyoung Jeon, Beiling Wu, Francesca Pincella, Makoto Ikenaga, Yoichi Tachibana, Yukari Ohta and Masaharu Nakamura*



1363

Phosphate-based phosphor for the urban mining of lanthanides: a case study of samarium

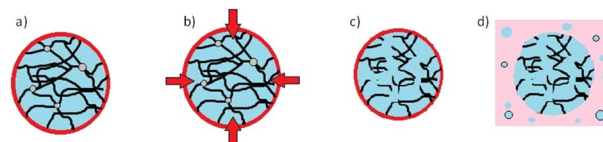
Yonglin Chen, Haoyi Wu* and Yihua Hu*



1367

Maximizing polypropylene recovery from waste carpet feedstock: a solvent-driven pathway towards circular economy

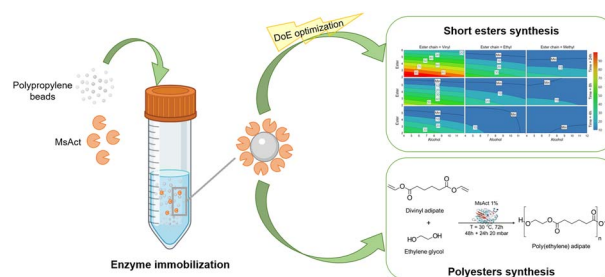
Heider Salazar, Ioan-Alexandru Baragau, Zhen Lu, Luis A. Román-Ramírez and Suela Kellici*



1372

Mycobacterium smegmatis acyltransferase catalyzes the synthesis of esters and polyesters

Filippo Fabbri, Ilaria Vergani, Silvia Donoso, Luca Nespoli, Valeria Marisa Rocca, Lisa Moni, Georg M. Guebitz, Martina Letizia Contente and Alessandro Pellis*



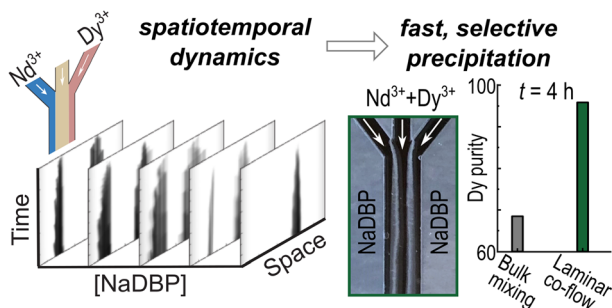
1378



The role of FAIR nanosafety data and nanoinformatics in achieving the UN sustainable development goals: the NanoCommons experience

Beatriz Alvaro Serrano, L. Cristiana Gheorghe, Thomas E. Exner, Susanne Resch, Clemens Wolf, Martin Himly, Andreas Falk, Nathan Bossa, Socorro Vazquez, Anastasios G. Papadiamantis, Antreas Afantitis, Georgia Melagraki, Dieter Maier, Haralabos Saramveis, Egon Willighagen, Vladimir Lobaskin, Jonathan D. Oldfield and Iseult Lynch*

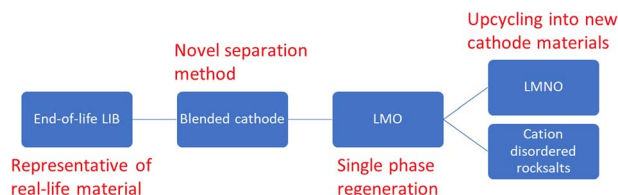
1400



Flow-driven enhancement of neodymium and dysprosium separation from aqueous solutions

Qingpu Wang and Chinmayee V. Subban*

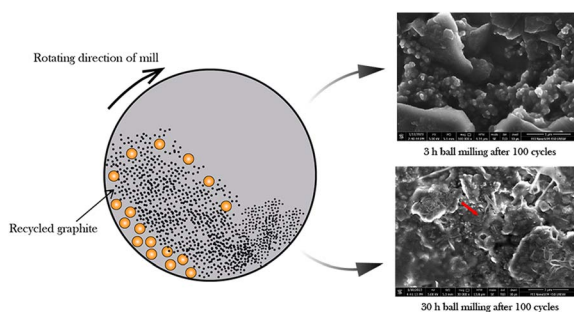
1408



Upcycling of low value end-of-life cathode material into next generation cathode materials

R. Madge,* A. Jarvis, W. Lima da Silva, L. L. Driscoll, P. A. Anderson and P. R. Slater

1418



Spent graphite from lithium-ion batteries: re-use and the impact of ball milling for re-use

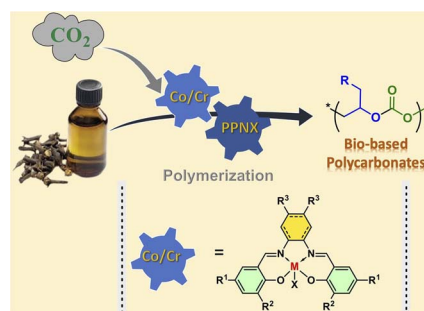
Jian Peng, Stefanie Maslek and Neeraj Sharma*



1431

Facile synthesis of polycarbonates from biomass-based eugenol: catalyst optimization for selective copolymerization of CO₂ and eugenol to achieve polycarbonates

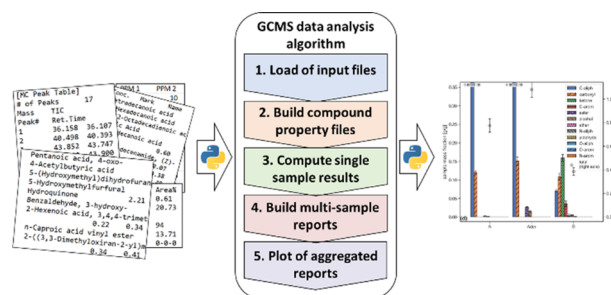
Mani Sengoden, Gulzar A. Bhat,* Tristan Roland, Chia-Min Hsieh and Donald J. Darensbourg*



1444

Open-source Python module to automate GC-MS data analysis developed in the context of bio-oil analyses

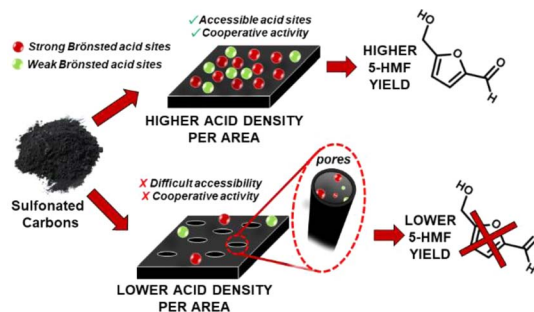
Matteo Pecchi* and Jillian L. Goldfarb



1456

Tailored sulfonated carbons: unraveling enhanced catalytic dynamics for fructose dehydration under conventional and microwave heating

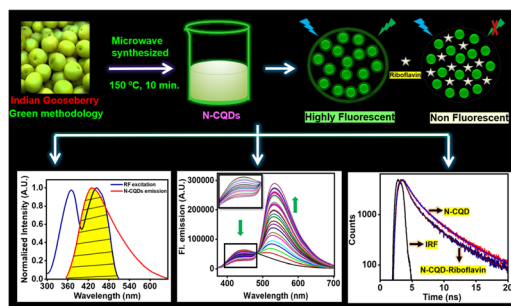
Gabrielle Mathias Reis, Letícia Ferreira Lima Machado, Renan Silva Nunes, Dalmo Mandelli and Wagner Alves Carvalho*



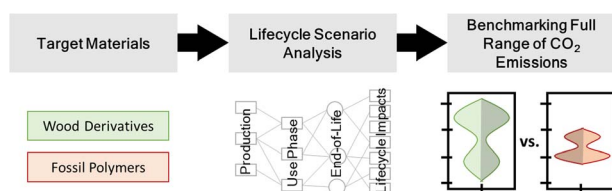
1472

Green transformation of biomass-derived Indian gooseberry into fluorescent intrinsic nitrogen-functionalized carbon quantum dots for real-time detection of vitamin B₂ in the nanomolar range

Mandeep Kaur, Mily Bhattacharya* and Banibrata Maity*



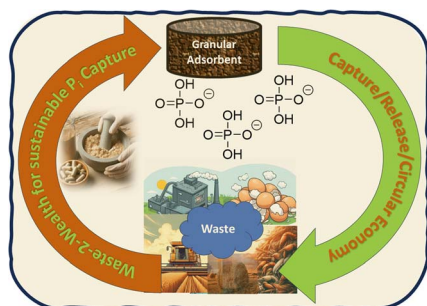
1487



Unraveling the climate neutrality of wood derivatives and biopolymers

Akshat Sudheshwar, Kealie Vogel, Gustav Nyström, Nadia Malinverno, Monica Arnaudo, Carlos Enrique Gómez Camacho, Didier Beloin-Saint-Pierre, Roland Hischer and Claudia Som*

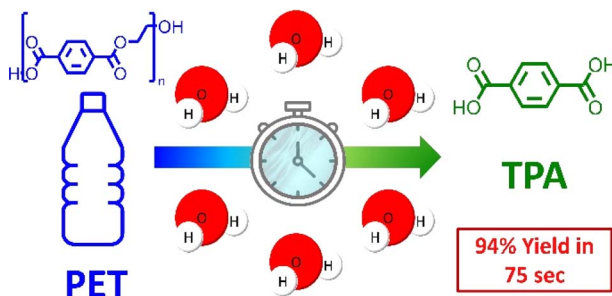
1498



Eggshell incorporated agro-waste adsorbent pellets for sustainable orthophosphate capture from aqueous media

Bernd G. K. Steiger, Nam T. Bui, Bolanle M. Babalola and Lee D. Wilson*

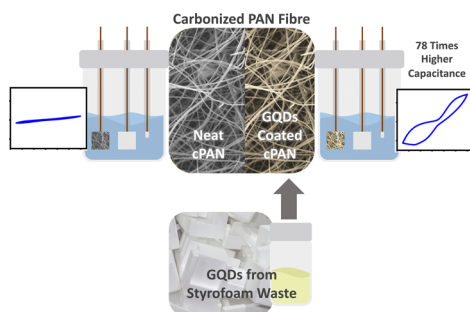
1508



Fast hydrolysis for chemical recycling of polyethylene terephthalate (PET)

Patrícia Pereira, Willem Slear, Angelo Testa, Kevin Reasons, Peter Guirguis, Phillip E. Savage* and Christian W. Pester*

1515



GQD-PAN-based high-performance supercapacitor: an approach towards wealth from waste

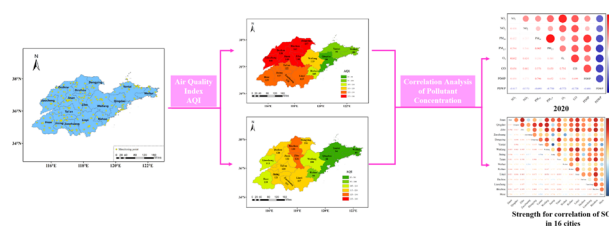
Dheeraj Kumar, Ekta Vashishth, Sweetly Rani, Advitiya Kumar, Bhanu Nandan, Supreet Singh Bahga and Rajiv K. Srivastava*



1528

Spatial and temporal differentiation of air quality and its influence factors in 16 cities in Shandong Province from 2019 to 2020

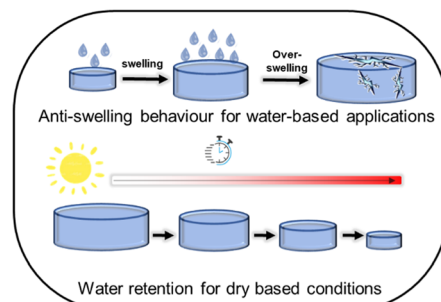
Ziheng Wan, Chuanxi Yang,* Xiaoning Wang,* Yan Xue, Jianai Zhao, Jiayi Cui, Qianqian Guo, HuiJuan Hua, Haofen Sun, Dong Chen, Weihua Zhao, Yihua Xiao and Weiliang Wang*



1543

Cellulose nanocrystal-mediated enhancement of hydrogel anti-swelling and water retention

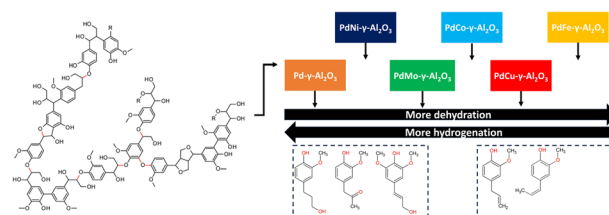
Kudzanai Nyamayaro, Takeo Iwase, Savvas G. Hatzikiriakos and Parisa Mehrkhodavandi*



1551

Enhancing the performance of heterogeneous palladium based catalysts in the mild reductive depolymerization of soda lignin through addition of a non-noble metal and tuning of the preparation strategy

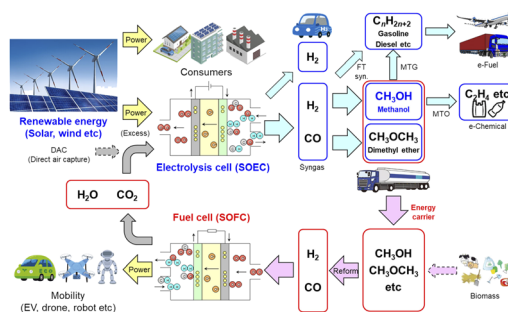
Tibo De Saegher, Boyana Atanasova, Pieter Vermeir, Kevin M. Van Geem, Jeriffa De Clercq, An Verberckmoes and Jeroen Lauwaert*



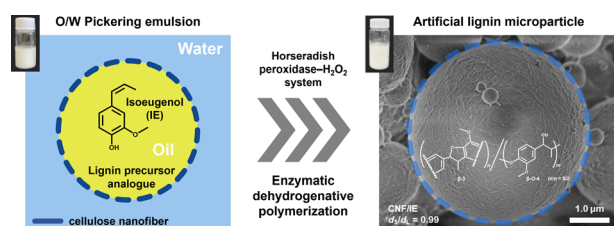
1568

Co-electrolysis SOEC and internal reforming SOFC for achieving a carbon-neutral society

Hirofumi Sumi*



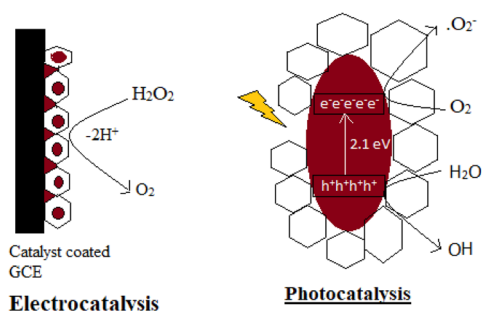
1580



Synthesis and structural design of microspheres comprising cellulose nanofibers and artificial lignin polymer by enzyme-mediated Pickering emulsion templating

Yuna Tanaka, Qi Li, Mayumi Hatakeyama and Takuya Kitaoka*

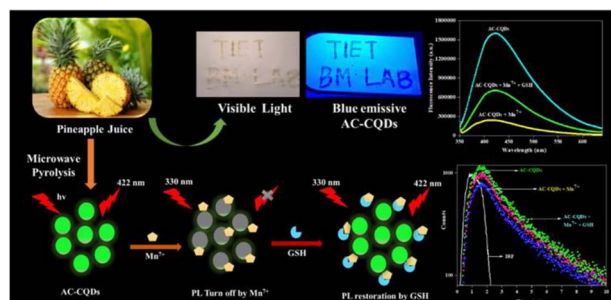
1590



Synthesis of a high dielectric constant graphene supported iron oxide and its electrocatalytic activity in a H₂O₂ fuel cell and as an efficient photocatalyst

Madhavi D. Shete* and J. B. Fernandes

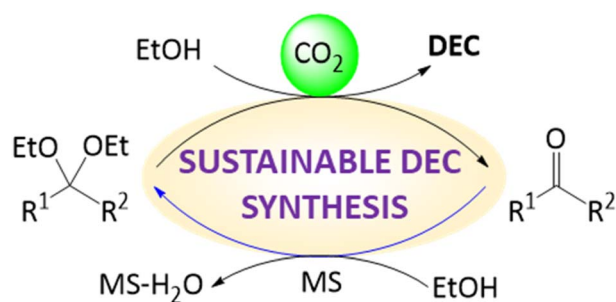
1599



Sustainable synthesis of carbon dots from *Ananas Comosus* as renewable biomass: nanomolar level detection of glutathione

Mallika Phull, Amjad Ali and Banibrata Maity*

1613



Sustainable synthesis of diethyl carbonate from carbon dioxide and ethanol featuring acetals as regenerable dehydrating agents

Wahyu S. Putro, Seiichiro Ijima, Seiji Matsumoto, Satoshi Hamura, Mizuho Yabushita, Keiichi Tomishige, Norihisa Fukaya* and Jun-Chul Choi*

