

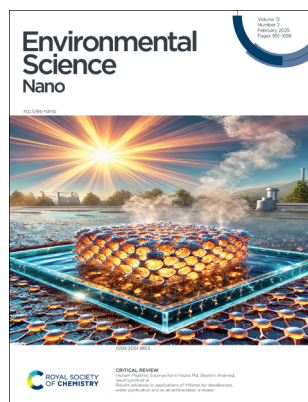
Environmental Science Nano

rsc.li/es-nano

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 2051-8153 CODEN ESNN4 12(2) 951-1698 (2025)



Cover

See Hicham Meskher, Soumya Kanti Hazra, Md. Shamim Ahamed, Iseult Lynch *et al.*, pp. 1012-1036. Image reproduced by permission of Iseult Lynch from *Environ. Sci.: Nano*, 2025, 12, 1012.



Inside cover

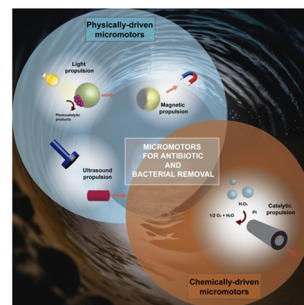
See Ikuna Kanehara *et al.*, pp. 1107-1115. Image reproduced by permission of Ikuna Kanehara, Tatsuhiro Nagasaka, Hirofumi Seki, Sho Fujii, Tsuyoshi Kimura, Masaya Yamamoto and Tadao Tanabe from *Environ. Sci.: Nano*, 2025, 12, 1107.

PERSPECTIVE

967

Micromotors for antimicrobial resistance bacteria inactivation in water systems: opportunities and challenges

Carmen Cuntín-Abal, Beatriz Jurado-Sánchez* and Alberto Escarpa*

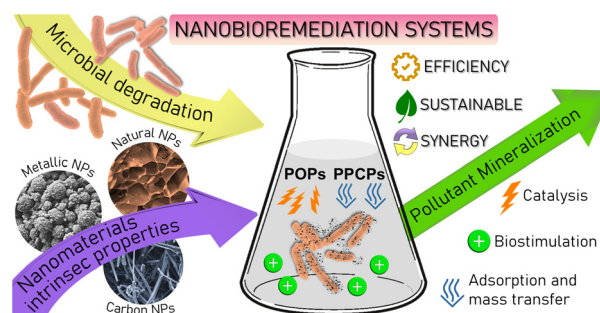


FRT

979

Nanobiotechnology approaches for the remediation of persistent and emerging organic pollutants: strategies, interactions, and effectiveness

E. Ezequiel Andrada Suarez, M. Eugenia Roca Jalil,* Martin A. Fernandez Baldo and Sergio A. Cuozzo*



Environmental Science: Atmospheres

GOLD
OPEN
ACCESS

Connecting communities
and inspiring new ideas

rsc.li/submittoEA

Fundamental questions
Elemental answers



Registered charity number: 207890

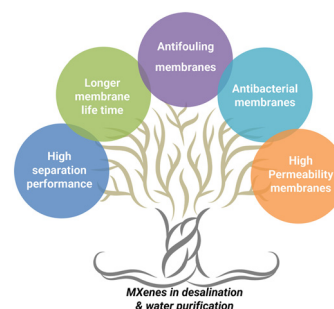


CRITICAL REVIEWS

1012

Recent advances in applications of MXenes for desalination, water purification and as an antibacterial: a review

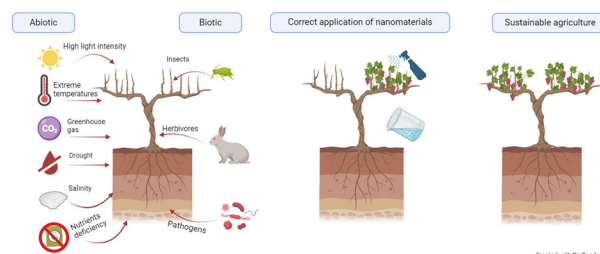
Hicham Meskher,* Amrit Kumar Thakur, Soumya Kanti Hazra,* Md. Shamim Ahamed,* Ahmed Mortuza Saleque, Qusay F. Alsalhy, Muhammad Wakil Shahzad, Md. Nahian Al Subri Ivan, Shuvra Saha and Iseult Lynch*



1037

Nanomaterials for managing abiotic and biotic stress in the soil-plant system for sustainable agriculture

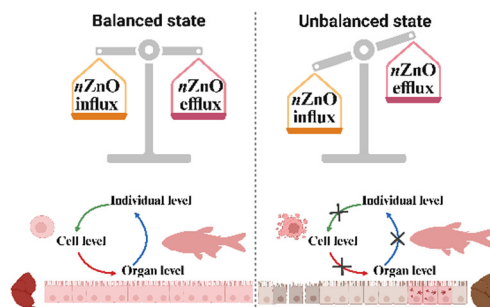
Loren Ochoa, Manoj Shrivastava, Sudhakar Srivastava, Keni Cota-Ruiz, Lijuan Zhao, Jason C. White,* Jose Angel Hernandez-Viezcas and Jorge L. Gardea-Torresdey*



1059

Two-sided cellular and physiological effects of zinc oxide nanoparticles (nZnO): a critical review

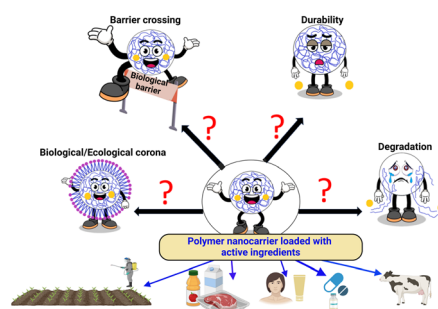
Anqi Sun, Shuoli Ma and Wen-Xiong Wang*



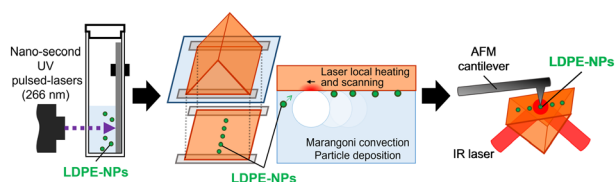
1079

Environmental and human risk assessment of polymer nanocarriers: a review on current analytical challenges and promising approaches

Dona Manayath, Jadranka Travas-Sejdic, Erin M. Leitao* and Melanie Kah*



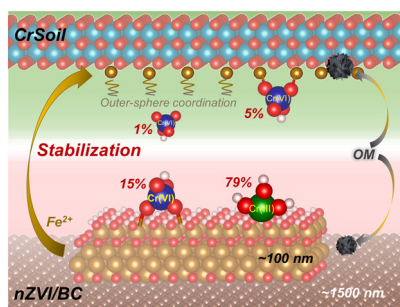
1107



Local infrared spectral measurement system for the inspection of independent nano-plastic particles in water-based solutions

Ikuna Kanehara,* Tatsuhiro Nagasaka, Hirofumi Seki, Sho Fujii, Tsuyoshi Kimura, Masaya Yamamoto and Tadao Tanabe

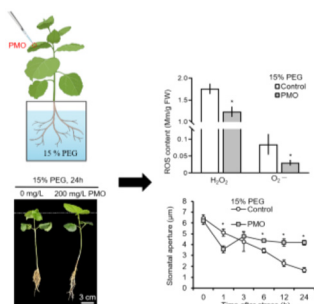
1116



Red mud-based Fe/C nanostructured materials for multi-interface remediation of Cr(VI)-contaminated soil and stabilization

Shiyu Cao, Jiangshan Li,* Jing Nie, Yanbiao Shi, Jiaqi Dong, Lizhi Zhang and Qiang Xue

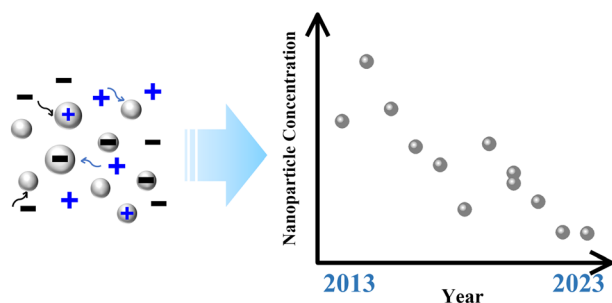
1126



Mn₃O₄ nanoparticles maintain ROS homeostasis to modulate stomatal aperture to improve cotton drought tolerance

Yanhui Li, Yunpeng Tao, Wenying Xu, Han Wu, Guangjing Li, Lin Yue, Jiangjiang Gu, Fangjun Li, Honghong Wu,* Juan Pablo Giraldo* and Zhaohu Li*

1138



Characterizing airborne nanoparticles in six Chinese cities based on their interactions with natural air ions

Jin Wu, Hao Wu, Yiran Li, Tingyu Liu, Mei Zheng, Cheng Huang, Fang Zhang, Jun Zhao, Jianwu Shi, Xiaoxiao Li, Yongchun Liu, Rujing Yin, Xiaotong Chen, Qiang Zhang, Jiming Hao and Jingkun Jiang*

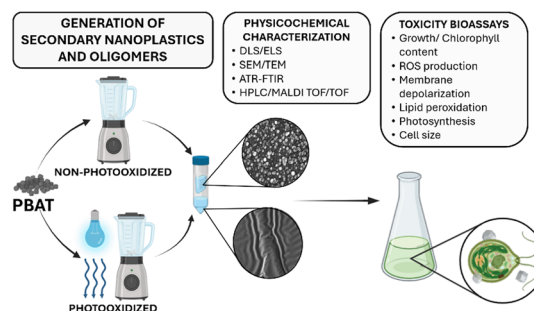


PAPERS

1150

An improved method to generate secondary nanoplastics and oligomers: application in ecotoxicology

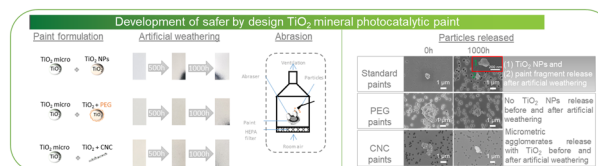
Silvia Gómez-Kong, Miguel Tamayo-Belda, Gerardo Pulido-Reyes, Carlos Edo, Irene Verdú, Francisco Leganés, Roberto Rosal, Miguel González-Pleiter and Francisca Fernández-Piñas*



1166

Towards the development of a safer by design mineral photocatalytic paint: influence of the TiO₂ modifications on particle release

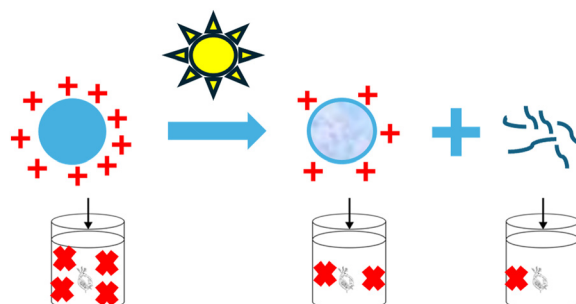
A. Rosset, I. Michaud-Soret, I. Capron, H. Voisin, G. Brochard, V. Bergé, A. Benayad, A. Guiot, S. Clavaguera and S. Artous*



1177

UV-B degradation affects nanoplastic toxicity and leads to release of small toxic substances

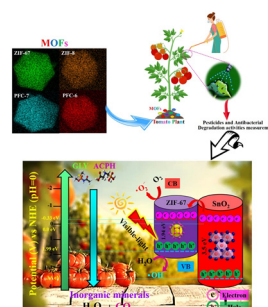
Mikael T. Ekvall, Raluca Svensson, Josep García Martínez, Annette M. Krais, Katja Bernfur, Thom Leiding, Martin Lundqvist and Tommy Cedervall*



1186

Designing MOF-based green nanomaterials for enhanced pathogen resistance and pesticide degradation in tomato plants

Shoaib Khan, Aoxue Wang,* Jiayin Liu,* Iltaf Khan,* Samreen Sadiq, Aftab Khan, Waleed Yaseen, Saeed Zaman, Abdul Mueed and Yuanyang Miao



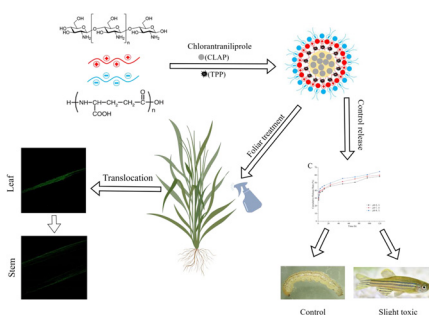
1202



Solid phase silver sulfide nanoparticles contribute significantly to biotic silver in agricultural systems

Yingnan Huang, Huijun Yan, Fei Dang,* Zhenyu Wang, Jason C. White and Yujun Wang

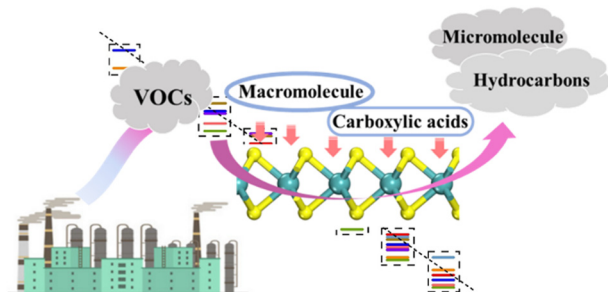
1214



Eco-friendly chitosan base chlorantraniliprole nanoparticles for effective control of *Chilo suppressalis* (Walker) through bidirectional transport

Ao Liang, Yunzheng Zhang, Xiang Xu, Hao Wang, Changwei Gong, Jie Hu, Xiangsong Li, Jizhi Yang, Anchun Peng and Xuegui Wang*

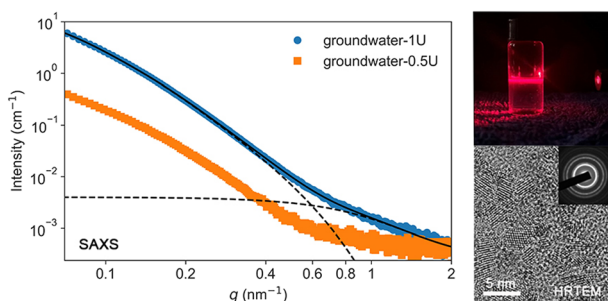
1230



Mechanistic insights into the adsorption of different types of VOCs on monolayer MoS₂ via first-principles approaches

Weina Zhao, Jinlong Wang, Chang Shen, Bufan Xie, Guiying Li and Taicheng An*

1240



Formation of stabilized vaterite nanoparticles via the introduction of uranyl into groundwater

Siyuan Wu, Jin Du, Jiebiao Li,* Mark Julian Henderson, Guangfeng Liu, Jianqiao Zhang, Na Li, Alain Gibaud and Qiang Tian*

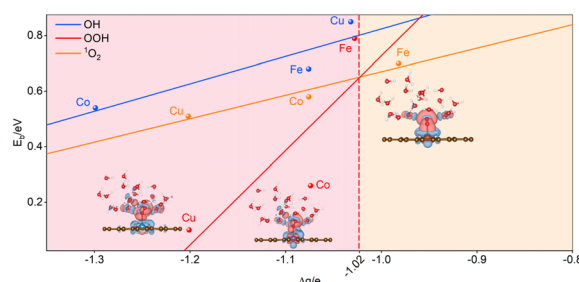


PAPERS

1249

Unveiling the micro-mechanism of H₂O₂ activation and the selective regulation strategy over single-atom catalysts

Zhengyang Gao, Yuanzheng Qu, Chu Wang, Ruiyang Shi, Yixiao Sun, Qingqi Yan, Chenliang Ye* and Weijie Yang*



The selectivity of H₂O₂ activation depends on charge transfer

1262

Catalytic reduction of SO₂ by Gd@CeO_x catalysts: stability enhancement and structural modulation

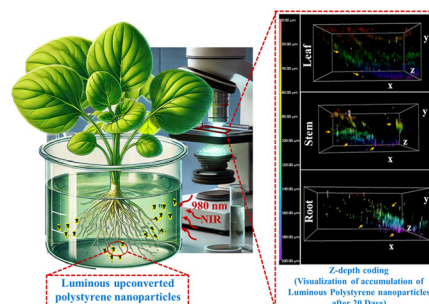
Mutao Xu, Xinpei Cheng, Liguang Chen, Qijie Jin,* Jian Yang,* Jing Song, Changcheng Zhou, Jisai Chen, Yongzhong Wang and Haitao Xu*



1273

Luminous polystyrene upconverted nanoparticles to visualize the traces of nanoplastics in a vegetable plant

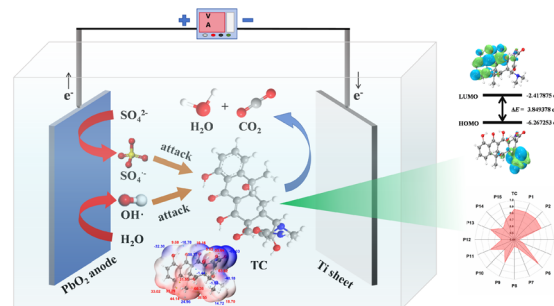
Bushra Maryam, Muhammad Asim, Jiaxuan Li, Hamna Qayyum and Xianhua Liu*



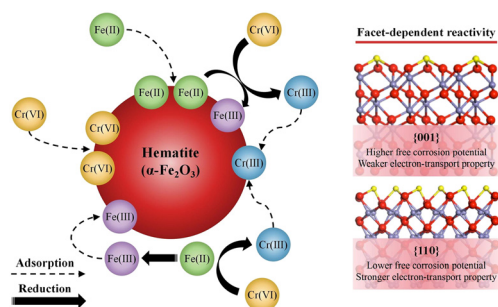
1288

Unveiling the intrinsic electrochemical mechanism of supporting electrolyte and the interaction mechanism in electrochemical oxidation of tetracycline with nano-PbO₂

Yaxuan Wang, Peitong Cen, Hongyu Wang, Chenxi Li, Ziyin Xia, Guoqing Wu, Meng Li,* Lei Huang, Jia Yan, Shaoqi Zhou, Ce-Hui Mo and Hongguo Zhang*



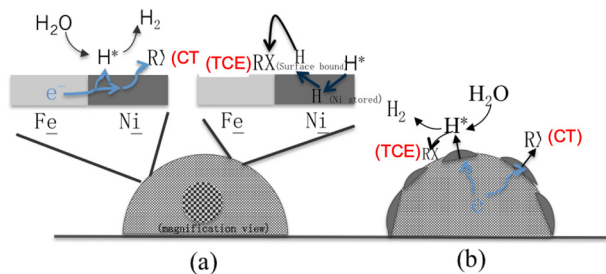
1305



Facet-dependent hematite reactivity in Cr(VI) removal with Fe(II)

Shengnan Zhang, Lingyi Li, Junxue Li and Wei Cheng*

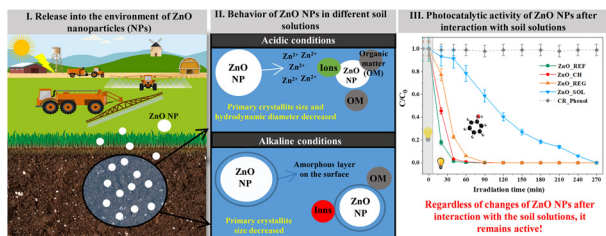
1316



Influence of nickel loading on reactivity of Ni/Fe bimetallic nanoparticles toward trichloroethene and carbon tetrachloride

Caijie Wei,* Weizhong Wu, Xufei Zhao, Cheng Sun, Zehan Shi, Jun Yang and Minghong Wu*

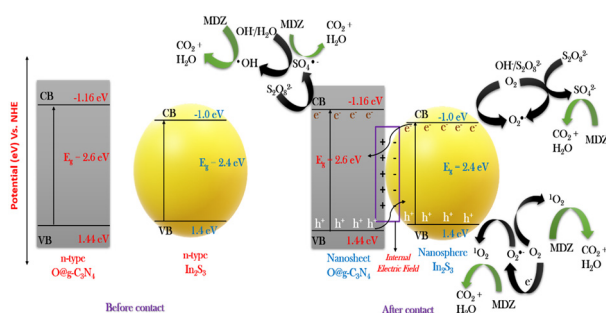
1328



Impact of different soil solutions on the stability and photocatalytic activity of commercial zinc oxide nanoparticles

Karolina Solymos, Eszter Kanász, Áron Ágoston, Tamás Gyulavári, Benjámin Pálffy, Ákos Szamosvölgyi, Ákos Kukovecz, Zoltán Kónya and Zsolt Pap*

1340



Bandgap-engineered In₂S₃ quantum dots anchored on oxygen-doped g-C₃N₄: forging a dynamic n-n heterojunction for enhanced persulfate activation and degradation of metronidazole

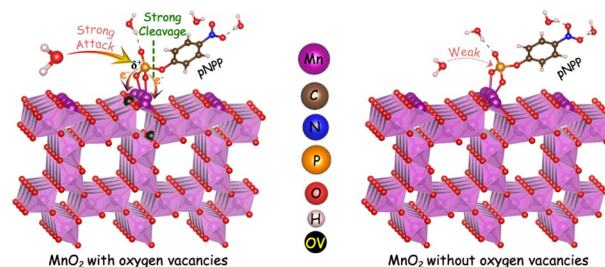
Soumya Ranjan Mishra, Vishal Gadore, Saptarshi Roy and Md. Ahmaruzzaman*



1364

Oxygen vacancies boost the efficacy of MnO_2 nanoparticles in catalyzing the hydrolytic degradation of organophosphate esters: implications for managing plastic additive pollution

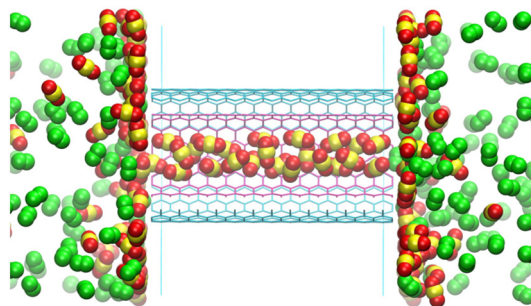
Zongsheng Liang, Keman Liu, Yueyue Li, Yaqi Liu, Chuanjia Jiang,* Tong Zhang* and Wei Chen



1375

High selectivity of CO_2 capture with single- and double-walled carbon nanotubes

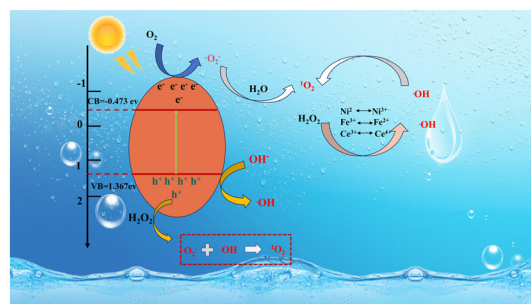
Winarto,* Lilis Yulianti, Purnami, Paul E. Brumby and Kenji Yasuoka



1384

A novel Ce-doped hydrotalcite for the efficient removal of tetracycline hydrochloride in the photo-Fenton system: from properties to mechanisms

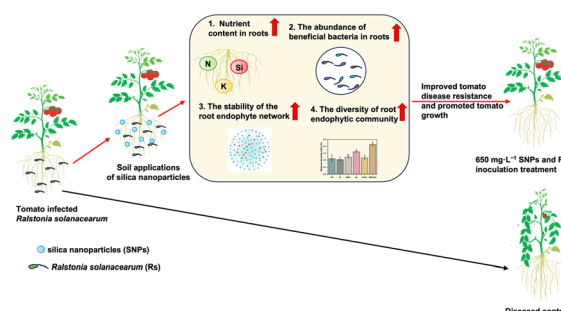
Yanshu Chen, Xia Liu, Ximan Wang, Shuanghui Sun, Yunfeng Wu, Siqi Bao* and Lei Xu*



1401

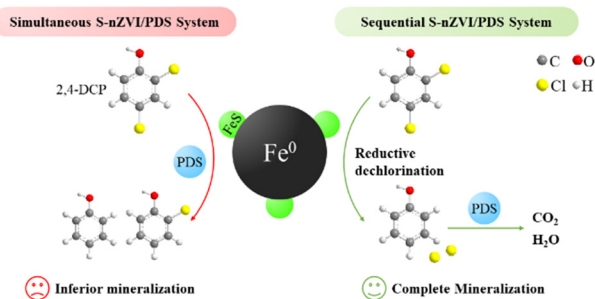
Silica nanoparticles enhance plant disease resistance by modulating the endophyte community structure in tomato (*Solanum lycopersicum* L.) roots

Lei Wang, Taowen Pan, Sicong Li, Yi Wang, Jason C. White, Baoshan Xing* and Kunzheng Cai*



PAPERS

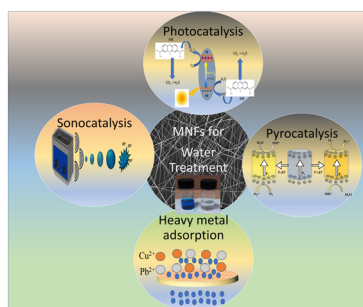
1414



Complete degradation of 2,4-dichlorophenol in a sequential sulfidated nanoscale zero-valent iron/ peroxydisulfate system: dechlorination, mineralization and mechanism

Zhoujie Pi,* Puyu Zhou, Kun Luo, Li He, Shengjie Chen, Zhu Wang, Shanshan Zhang, Xiaoming Li and Qi Yang*

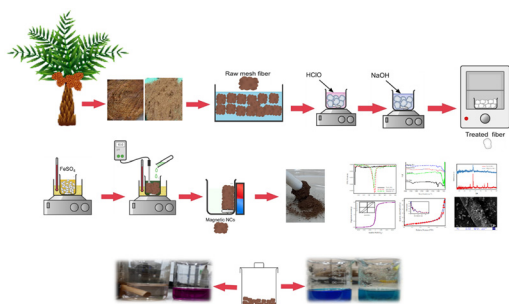
1431



Piezoelectric nanogenerators with hybrid nanofibers: a dual approach for energy generation and wastewater treatment

Manish Kumar, Sumit Choudhary, Satinder K. Sharma and Jaspreet Kaur Randhawa*

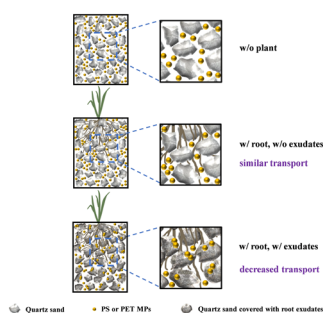
1446



Biomass-based water purification: a simple and novel one-pot process for converting date palm mesh fibers into a valuable nanomagnetic composite for water treatment

Batool Vahedi Sarrygani, Fayeze Samari* and Fatemeh Sedaghati

1466



Quartz sand surface-bound rice root exudates decreased the transport of microplastics in porous media

Genyao Gu, Dan Wu, Yanan Liu, Junfu Wang, Yunfei Zhang, Xiaopeng Min and Li Cai*

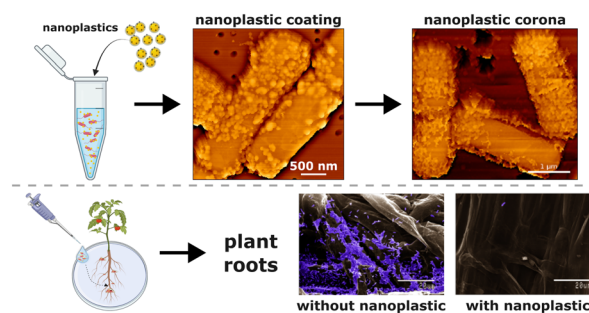


PAPERS

1477

Adaptive responses of *Bacillus subtilis* underlie differential nanoplastic toxicity with implications for root colonization

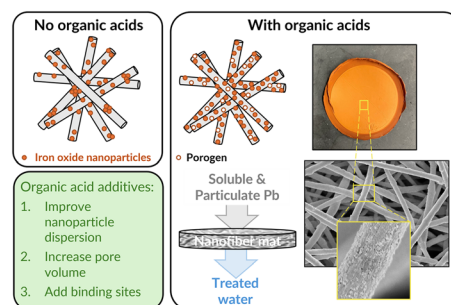
Franklin Perez, Nesha May O. Andoy, Uyan Tran Thao Hua, Keiko Yoshioka and Ruby May A. Sullan*



1487

Polymer-iron oxide nanofiber composites for lead removal: performance improvements through organic acid stabilization of nanoparticles to promote surface segregation during electrospinning

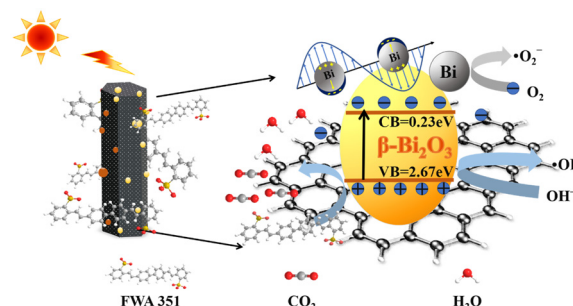
Sewoon Kim, Yun Young Choi, Chang Min Park, Nosang V. Myung and David M. Cwiertny*



1501

A novel route to synthesize Bi/ β -Bi₂O₃@carbon: mechanism and performance for efficient degradation of organic pollutants

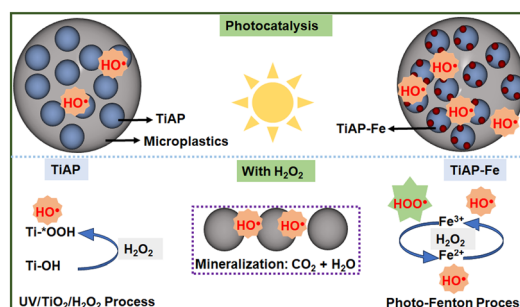
Xia Zhang, Yifang Zhang, Xitong Yang, Jiaxin Han, Guifen Zhu and Jing Fan*



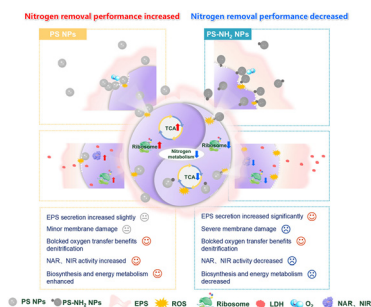
1515

Insights in photocatalytic/Fenton-based degradation of microplastics using iron-modified titanium dioxide aerogel powders

Guru Karthikeyan Thirunavukkarasu,* Monika Motlochová, Dmytro Bovol, Anna Vykydalová, Jaroslav Kupčík, Michal Navrátil, Kaplan Kirakci, Eva Pližingrová, Dana Dvoranová and Jan Šubrt



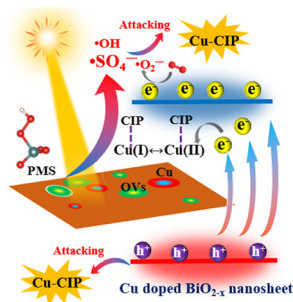
1531



Effects of unmodified and amine-functionalized polystyrene nanoplastics on nitrogen removal by *Pseudomonas stutzeri*: strain characteristics, extracellular polymers, and transcriptomics

Rui Yang, Jianwei Qu, Hanxiang Li, Weile Meng, Xiaowei Xu, Jinsong Guo and Fang Fang*

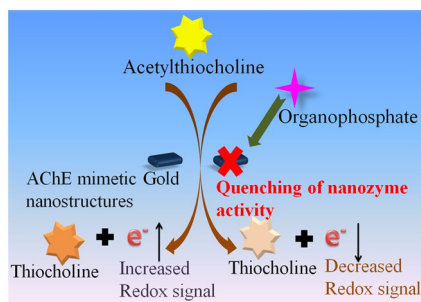
1545



Enhanced peroxydisulfate activation by copper-doped bismuth oxides for the efficient photo-degradation of ciprofloxacin: crucial role of copper sites, theoretical calculation and mechanism insight

Wei Wang, Zhixiong Yang, Yuan Li, Junting Wang and Gaoke Zhang*

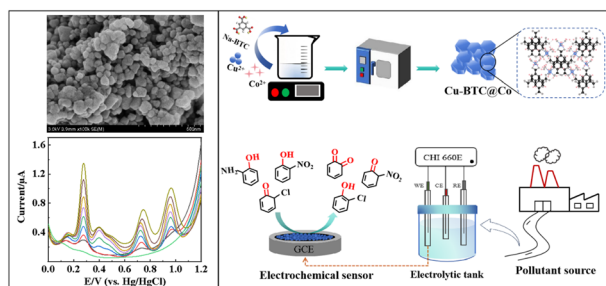
1558



Investigating gold nanorod-mediated hydrolysis of acetylthiocholine: a way for electrochemical detection of organophosphate pesticides

Chumki Praharaj, Smriti Singh, Pranav Tripathi and Seema Nara*

1570



Efficient, simultaneous, quantitative and qualitative detection of multiple phenols using highly water-stable Co^{2+} -doped Cu-BTC as an electrocatalyst

Yuanfang Li, Xiaoshu Lv, Yan Liu, Jie Yin, Ruimei Fang,* Guangming Jiang* and Zhehan Yang*

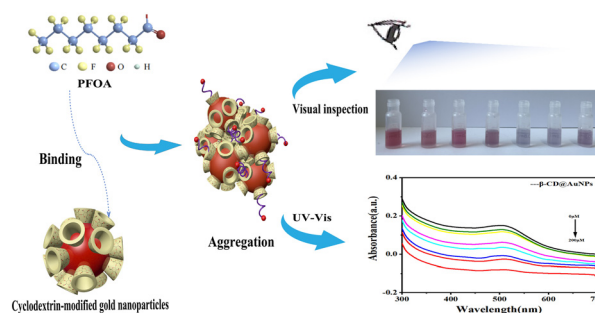


PAPERS

1581

Colorimetric visualization detection of perfluorooctanoic acid based on host–guest interactions with cyclodextrin-modified gold nanoparticles

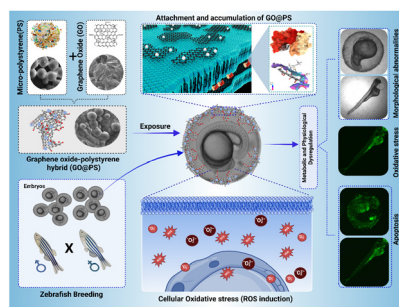
Jiateng Ma, Chuang Liu, Jiali Li, Zhiquan An, Bihong Zhang, Wenjun Hong, Cheng Ye, Minjie Li* and Liang-Hong Guo*



1592

Unravelling the *in vivo* biotoxicity of a green-biofabricated graphene oxide–microplastic hybrid mediated by proximal intrinsic atomic interactions

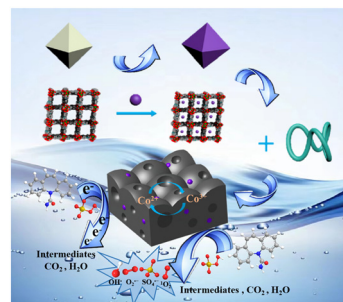
Adrija Sinha, Sudakshya S. Lenka, Abha Gupta, Dibyangshee Singh, Anmol Choudhury, Shaikh Sheeran Naser, Aishee Ghosh, Faizan Zarreen Simnani, Aditya Nandi, Richa Mishra, Suresh K. Verma* and Mrutyunjay Suar*



1609

Efficient bimetallic metal–organic framework derived magnetic Co/N-PC-800 nanoreactor for peroxymonosulfate activation and carbamazepine degradation

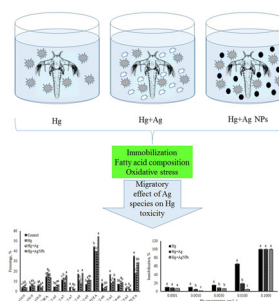
Qiao-Qiao Huang, Yu-Mei Wang, Xun Fu, Xiao-Li Hu,* Jia-Wei Wang* and Zhong-Min Su*



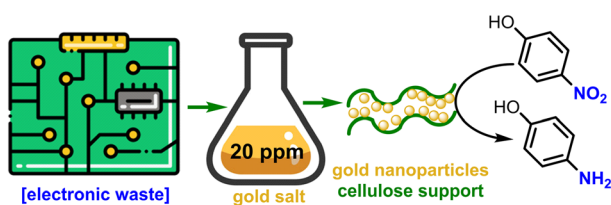
1626

Toxicity of mercuric chloride when combined with ionic and nanoparticulate silver on *Artemia salina*: growth, fatty acid composition, oxidative stress, and lipid peroxidation

Nahid Ravantab, Zahra Ghasemi,* Seyed Ali Johari and Richard D. Handy



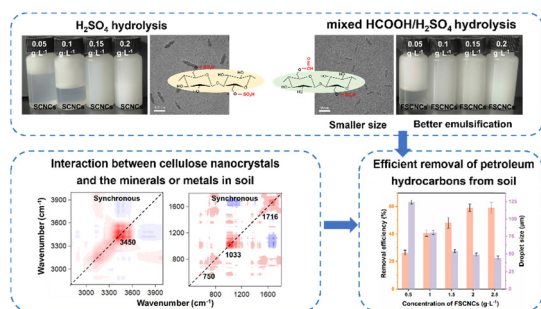
1638



Catalytic performance of electronic waste-derived gold nanoparticles for the reduction of p -nitrophenol

Michelle Y. Lau,* David C. Young, Jack L.-Y. Chen and Jonathan Sperry*

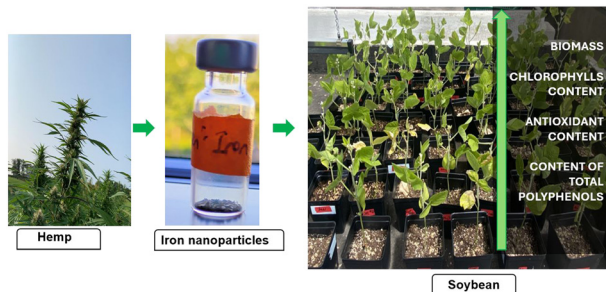
1657



Promoted solubilization and desorption of petroleum hydrocarbons to remediate contaminated soils using Pickering emulsions stabilized by cellulose nanocrystals

Yi Yang, Yi Ma, Tingting Huang, Xiaoming Song, Yinqing Zhang* and Lingyan Zhu

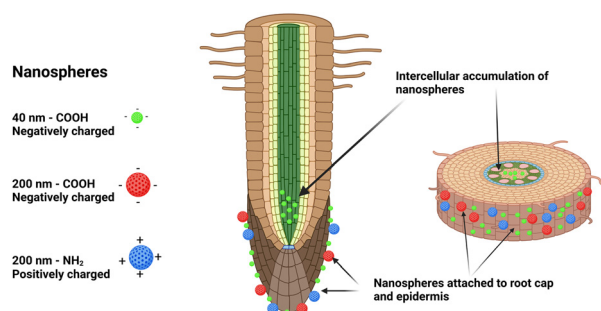
1669



Upcycling plant waste: iron nanoparticles synthesized from *Cannabis sativa* enhance biomass and antioxidative properties in soybean (*Glycine max*)

Milica Pavlicevic, Shital Vaidya, Terri Arsenault, Anuja Bharadwaj, Craig Musante, Yingxue Yu, Itamar Shabtai, Joseph Liquori, Jose A. Hernandez-Viezas, Vinka Oyanedel-Craver, Jorge L. Gardea-Torresdey, Christian O. Dimkpa, Jason C. White and Nubia Zuverza-Mena*

1685



Uptake of polystyrene nanospheres by wheat and *Arabidopsis* roots in agar, hydroponics, and soil

Kaushik Adhikari, Karen A. Sanguinet, Carolyn I. Pearce and Markus Flury*

