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IN THIS ISSUE

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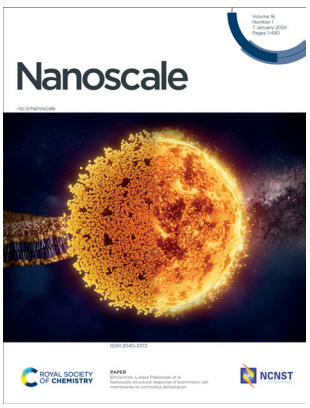

Cover
See Emilia Krok, Lukasz Piatkowski *et al.*, pp. 72–84.

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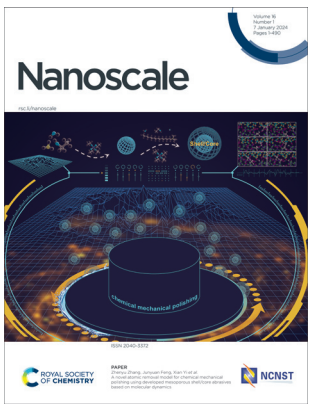

Inside cover
See Zhenyu Zhang, Junyuan Feng, Xian Yi *et al.*, pp. 85–96.

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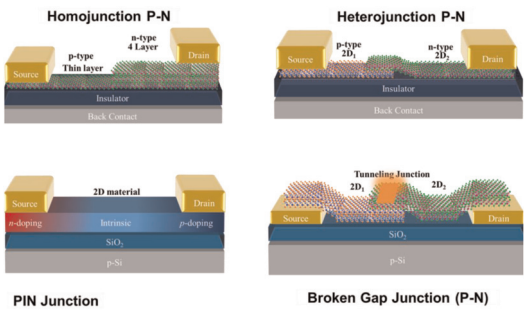
REVIEW

14

Contemporary innovations in two-dimensional transition metal dichalcogenide-based P–N junctions for optoelectronics

Ehsan Elahi,* Muneeb Ahmad, A. Dahshan, Muhammad Rabeel, Sidra Saleem, Van Huy Nguyen, H. H. Hegazy and Sikandar Aftab*

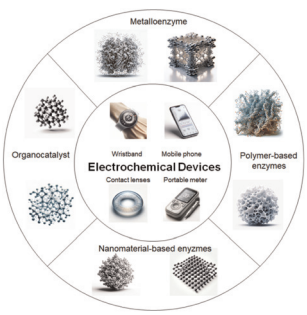


MINIREVIEW

44

Artificial enzyme innovations in electrochemical devices: advancing wearable and portable sensing technologies

Long Zheng, Mengzhu Cao, Yan Du, Quanyi Liu, Mohammed Y. Emran, Ahmed Kotb, Mimi Sun,* Chong-Bo Ma* and Ming Zhou*



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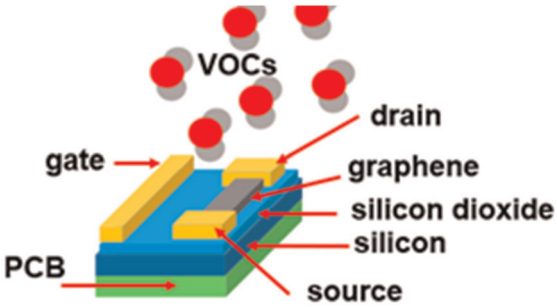
COMMUNICATION

61

Detection of medically relevant volatile organic compounds with graphene field-effect transistors and separated by low-frequency spectral and time signatures

Bruno Gil,* Dominic Wales, Haijie Tan and Eric Yeatman

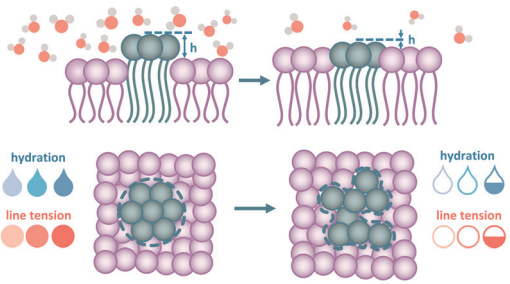


PAPERS

72

Nanoscale structural response of biomimetic cell membranes to controlled dehydration

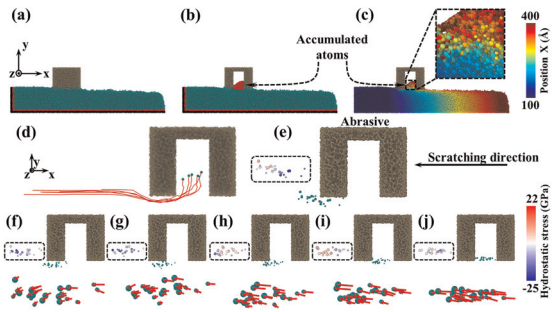
Emilia Krok,* Henri G. Franquelim, Madhurima Chattopadhyay, Hanna Orlikowska-Rzeznik, Petra Schwille and Lukasz Piatkowski*



85

A novel atomic removal model for chemical mechanical polishing using developed mesoporous shell/core abrasives based on molecular dynamics

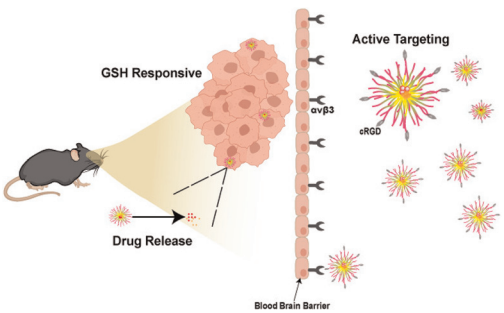
Zhensong Liu, Zhenyu Zhang,* Junyuan Feng,* Xian Yi,* Chunjing Shi, Yang Gu, Feng Zhao, Shihao Liu and Jingru Li



97

Sensitizing chemotherapy for glioma with fisetin mediated by a microenvironment-responsive nano-drug delivery system

Wanyu Wang, Yuanyuan Zhang, Yue Jian, Shi He, Jiagang Liu, Yongzhong Cheng, Songping Zheng, Zhiyong Qian, Xiang Gao and Xiang Wang*



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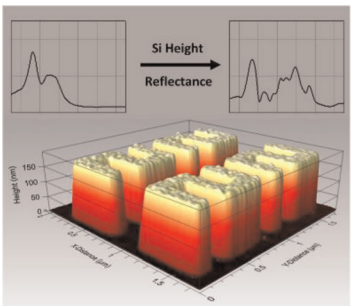
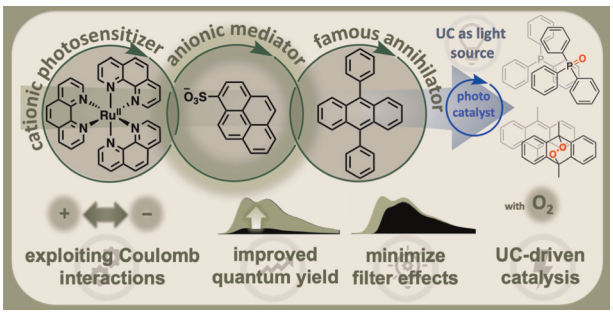
110



Tuning dipolar and multipolar resonances of chiral silicon nanostructures for control of near field superchirality

Dominic J. P. Koyroytsaltis-McQuire,* Rahul Kumar, Tamas Javorfi, Giuliano Siligardi, Nikolaj Gadegaard and Malcolm Kadodwala*

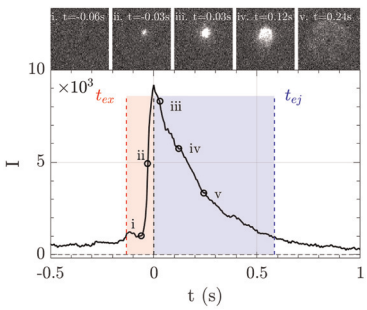
123



Coulomb interactions for mediator-enhanced sensitized triplet–triplet annihilation upconversion in solution

Felix Glaser, Matthias Schmitz and Christoph Kerzig*

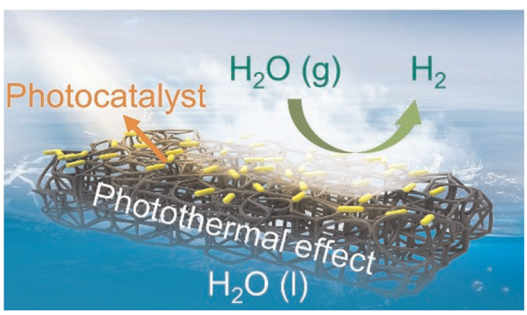
138



Optical single molecule characterisation of natural and synthetic polymers through nanopores

Charlotte de Blois, Marie Engel, Marie-Amélie Rejou, Bastien Molcrette, Arnaud Favier* and Fabien Montel*

152



Photothermally driven decoupling of gas evolution at the solid–liquid interface for boosted photocatalytic hydrogen production

Shidong Zhao, Chunyang Zhang, Shujian Wang, Kejian Lu, Biao Wang, Jie Huang, Hao Peng, Naixu Li and Maochang Liu*

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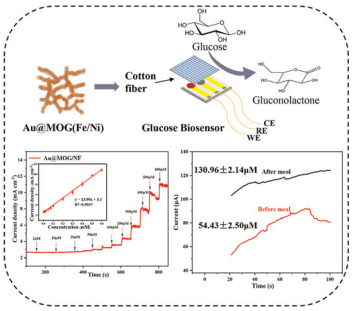
PAPERS

163

A wearable AuNP enhanced metal–organic gel (Au@MOG) sensor for sweat glucose detection with ultrahigh sensitivity

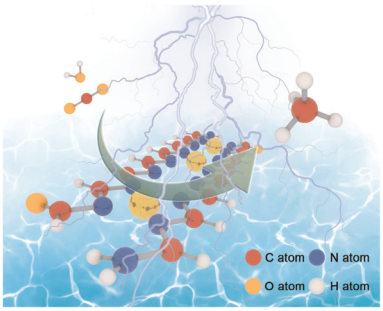
Dengfeng Zhou, Shuangbin Zhang, Atta Ullah Khan, Lan Chen* and Guanglu Ge*



171

Pyrolysis-free synthesis of a high-loading single-atom Cu catalyst for efficient electrocatalytic CO_2-to-CH_4 conversion

Jiawei Li, Yawen Jiang, Jiayi Li, Xinyu Wang, Hengjie Liu, Ning Zhang,* Ran Long* and Yujie Xiong*



180

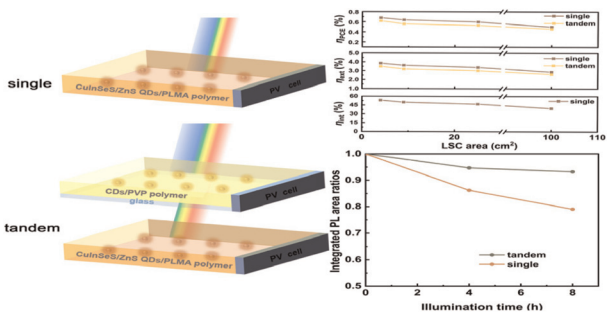
Electron-beam writing of a relaxor ferroelectric polymer for multiplexing information storage and encryption

Yongshuang Li, Yingxin Chen,* Huigui Fang, Jingchao Shi, Yichen Xue, Rongjie Ma, Jingtao Zhou, Ni Yao, Jian Zhang* and Xuefeng Zhang

188

Highly efficient and stable tandem luminescent solar concentrators based on carbon dots and $CuInSe_{2-x}S_x$/ZnS quantum dots

Lianju Wang, Yiqing Chen, Yueling Lai, Xianglong Zhao, Kanghui Zheng, Ruilin Wang and Yufeng Zhou*



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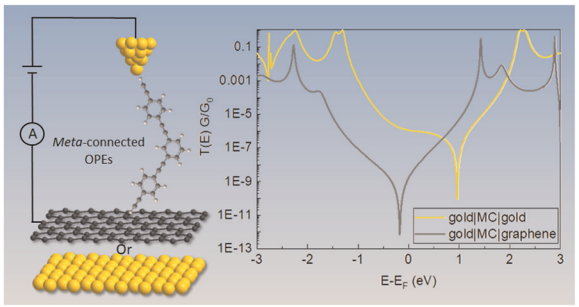
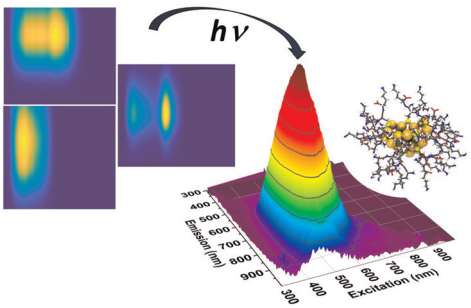


Destructive quantum interference in *meta*-oligo(phenyleneethynylene) molecular wires with gold–graphene heterojunctions

Yinqi Fan, Shuhui Tao, Sylvain Pitié, Chenguang Liu, Chun Zhao, Mahamadou Seydou, Yannick J. Dappe, Paul J. Low, Richard J. Nichols and Li Yang*

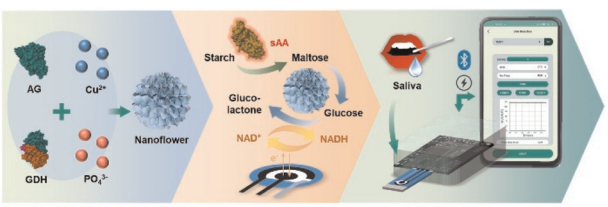
205



Accelerated size-focusing light activated synthesis of atomically precise fluorescent $Au_{22}(Lys–Cys–Lys)_{16}$ clusters

Parimah Aminfar, Travis Ferguson, Emily Steele, Emerson M. MacNeil, María Francisca Matus, Sami Malola, Hannu Häkkinen, Paul N. Duchesne, Hans-Peter Loock and Kevin G. Stamplecoskie*

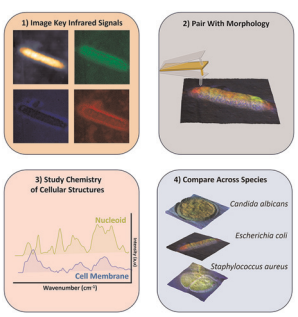
212



Development of enzyme–inorganic hybrid nanoflower-modified electrodes and a smartphone-controlled electrochemical analyzer for point-of-care testing of salivary amylase in saliva

Cong Liu, Xia Gong, Xiao Yang, Zipei Yu, Weihao Li, Guangyi Liao, Chuanquan Lin,* Lelun Jiang* and Changqing Yi*

223



Photoinduced force microscopy as a novel method for the study of microbial nanostructures

Josh Davies-Jones,* Philip R. Davies,* Arthur Graf, Dan Hewes, Katja E. Hill and Michael Pascoe

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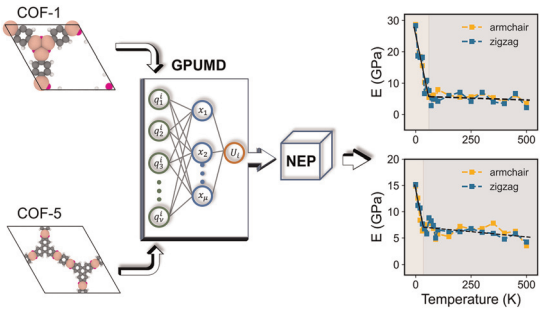
237

The thermoelastic properties of monolayer covalent organic frameworks studied by machine-learning molecular dynamics

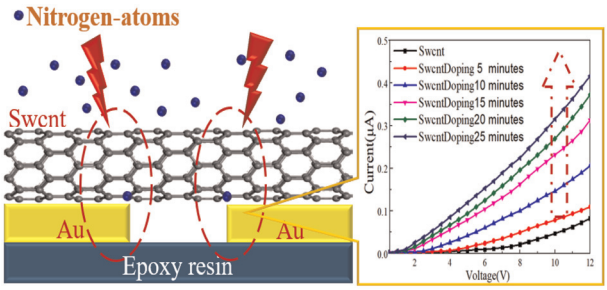
Bing Wang, Penghua Ying and Jin Zhang*



249

Theoretical and experimental investigations of enhanced carbon nanotube-gold interface conductivity through nitrogen doping

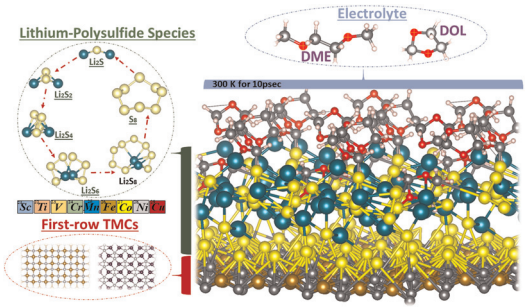
Rui Miao, Yujian Liang, Ruolan Wen, Zhenhong Jiang, Yue Wang and Qingyi Shao*



262

First-row transition metal carbide nanosheets as high-performance cathode materials for lithium–sulfur batteries

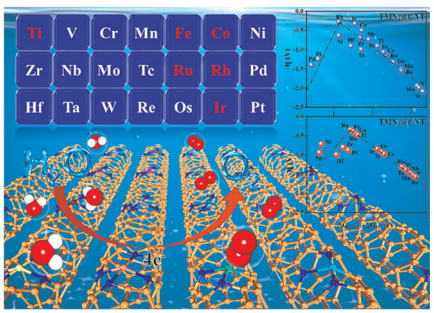
Imran Muhammad, Shehzad Ahmed, Zhen Yao, Danish Khan, Tanveer Hussain and Yang-Gang Wang*



273

Realizing a high OER activity in new single-atom catalysts formed by introducing TMN_x (x = 3 and 4) units into carbon nanotubes using high-throughput calculations

Xia Yang, Guangtao Yu* and Wei Chen*



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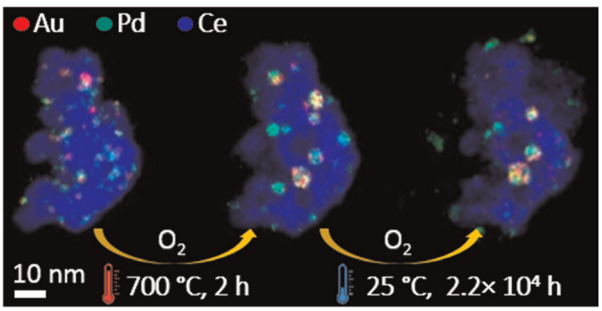
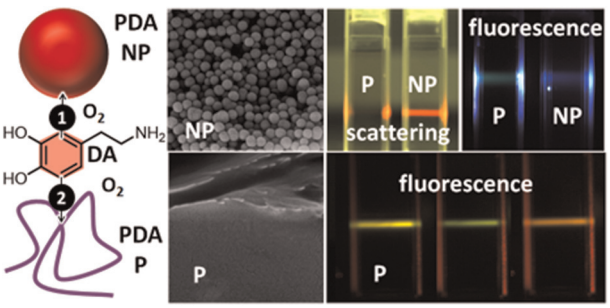


Temperature-driven evolution of ceria–zirconia-supported AuPd and AuRu bimetallic catalysts under different atmospheres: insights from IL-STEM studies

Lidia Chinchilla,* Ramón Manzorro, Carol Olmos, Xiaowei Chen, José J. Calvino and Ana B. Hungría

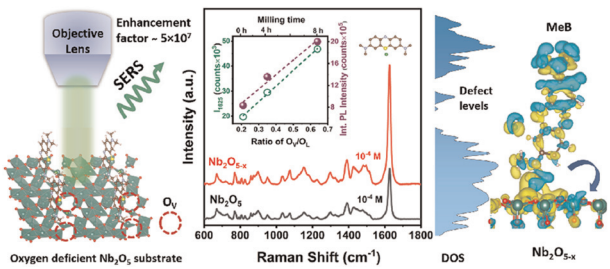
299



The dual nature of biomimetic melanin

Alexandra Mavridi-Printezi, Stefano Giordani, Arianna Menichetti, Dario Mordini, Andrea Zattoni, Barbara Roda, Lucia Ferrazzano, Pierluigi Reschiglian, Valentina Marassi* and Marco Montalti*

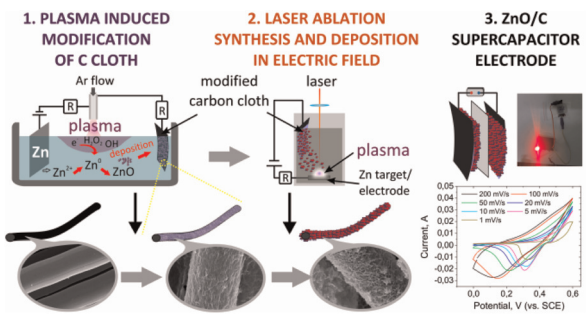
309



Evidence of oxygen vacancy-mediated ultrahigh SERS sensitivity of Niobium pentoxide nanoparticles through defect engineering: Theoretical and experimental studies

Sirsendu Ghosal, Abhilasha Bora and P. K. Giri*

322



Electric field-assisted laser ablation fabrication and assembly of zinc oxide/carbon nanocomposites into hierarchical structures for supercapacitor electrodes

Natalie N. Tarasenka,* Vladislav G. Kornev, Mikhail I. Nedelko, Hanna M. Maltanova, Sergey K. Poznyak and Nikolai V. Tarasenko

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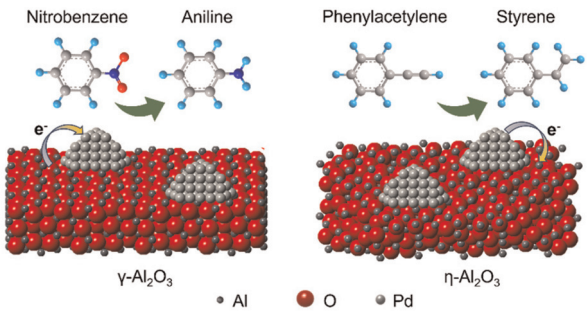
335

Tuning the electronic structure of Pd by the surface configuration of Al_2O_3 for hydrogenation reactions

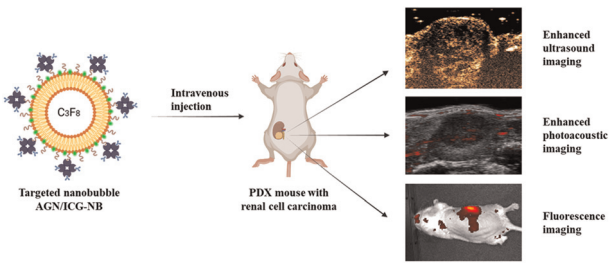
Yinglei Liu, Chicheng Ma, Jiye Zhang, Huiying Zhou, Gaowu Qin and Song Li*



343

Nanobody-loaded nanobubbles targeting the G250 antigen with ultrasound/photoacoustic/fluorescence multimodal imaging capabilities for specifically enhanced imaging of RCC

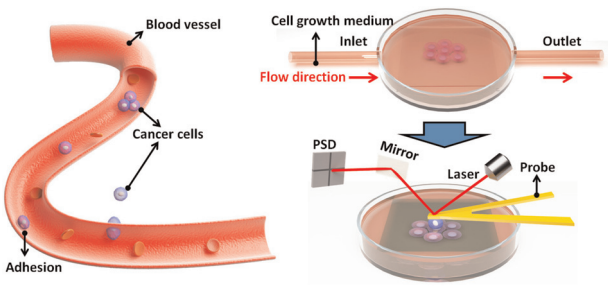
Jiajiu Chen, Jingyi Li, Chengjie Zhong, Yi Ling, Deng Liu, Xin Li, Jing Xu, Qiuli Liu, Yanli Guo* and Luofu Wang*



360

Single-cell force spectroscopy of fluid flow-tuned cell adhesion for dissecting hemodynamics in tumor metastasis

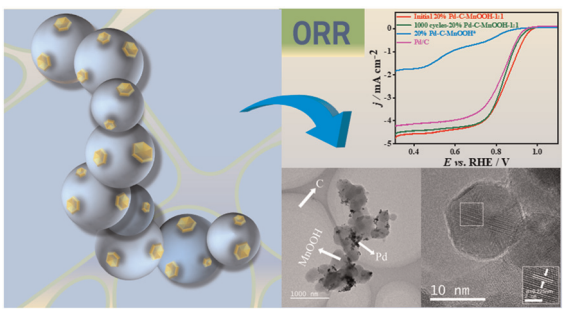
Jiajia Wei, Yanqi Yang and Mi Li*



373

Synthesis of MnOOH and its application in a supporting hexagonal Pd/C catalyst for the oxygen reduction reaction

Zheng Cheng, Wei Cheng, Xin-Ning Lin, Rong-Hua Zhang,* Luo-Yi Yan, Gui-Xian Tian, Xiao-Yu Shen and Xin-Wen Zhou*



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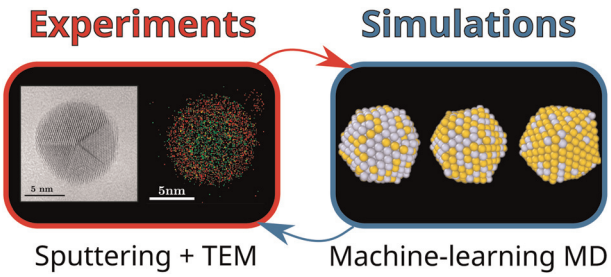
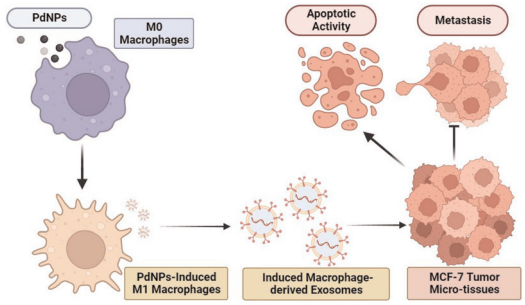
384



Exploring the formation of gold/silver nanoalloys with gas-phase synthesis and machine-learning assisted simulations

Quentin Gromoff, Patrizio Benzo, Wissam A. Saidi, Christopher M. Andolina, Marie-José Casanove, Teresa Hungria, Sophie Barre, Magali Benoit and Julien Lam*

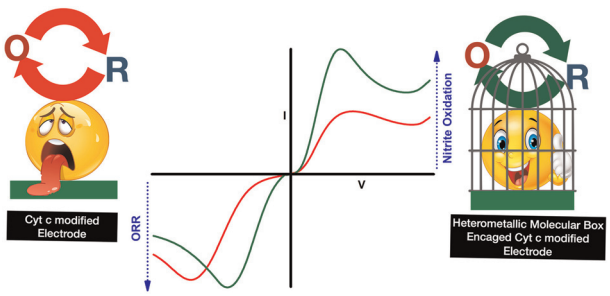
394



Manipulating macrophage polarization with nanoparticles to control metastatic behavior in heterotypic breast cancer micro-tissues *via* exosome signaling

Mustafa Sungu, Melis Isik, Ülkü Güler, Cemil Can Eylem, Hakan Eskizengin, Emirhan Nemutlu, Bekir Salih and Burak Derkus*

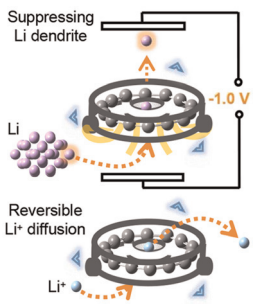
411



The enhanced electrocatalytic performance of nanoscopic $Cu_6Pd_{12}Fe_{12}$ heterometallic molecular box encaged cytochrome c

Shazia Nabi, Feroz Ahmad Sofi, Qounsar Jan, Aamir Y. Bhat, Pravin P. Ingole, Maryam Bayati and Mohsin Ahmad Bhat*

427



Using a cyclocarbon additive as a cyclone separator to achieve fast lithiation and delithiation without dendrite growth in lithium-ion batteries

Jiacheng Gong, Jiabao Zhu, Xiao He* and Jinrong Yang*

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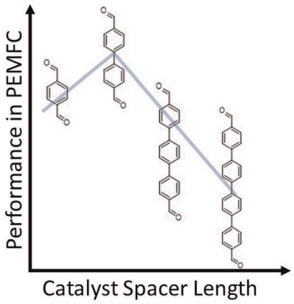
PAPERS

438

Tuning the performance of Fe–porphyrin aerogel-based PGM-free oxygen reduction reaction catalysts in proton exchange membrane fuel cells

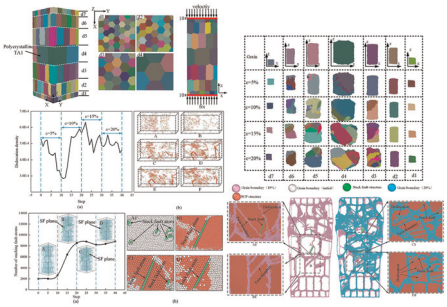
Yeela Persky, Yan Yurko, Rifael Z. Snitkoff-Sol, Noam Zion and Lior Elbaz*



447

Deformation mechanisms based on the multiscale molecular dynamics of a gradient TA1 titanium alloy

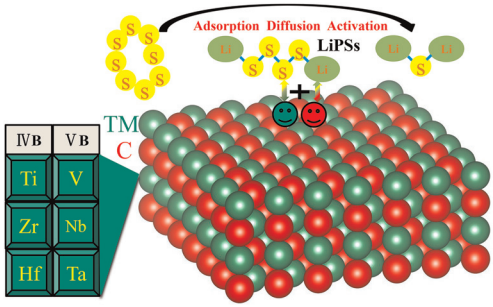
Yulian Jiang, Zhiguo Feng* and Liang Tao



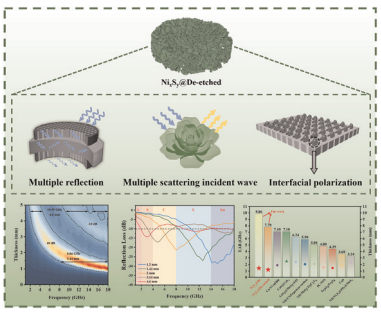
462

Theoretical investigation of synergistically boosting the anchoring and electrochemical performance of lithiophilic/sulfiphilic transition metal carbides for lithium–sulfur batteries

Mingyang Wang, Jianjun Mao, Yudong Pang, Xilin Zhang, Zongxian Yang,* Zhansheng Lu* and Shuting Yang*



474

Three-dimensional biotemplate-loaded nickel sulfide vacancies engineered to promote the absorption of electromagnetic waves

Wenrui Zhu, Dashuang Wang, Zhilan Du, Yan Liao, Kai Zhang, Shuai Xie, Wenxin Dong, Jinsong Rao, Yuxin Zhang* and Xiaoyin Liu*