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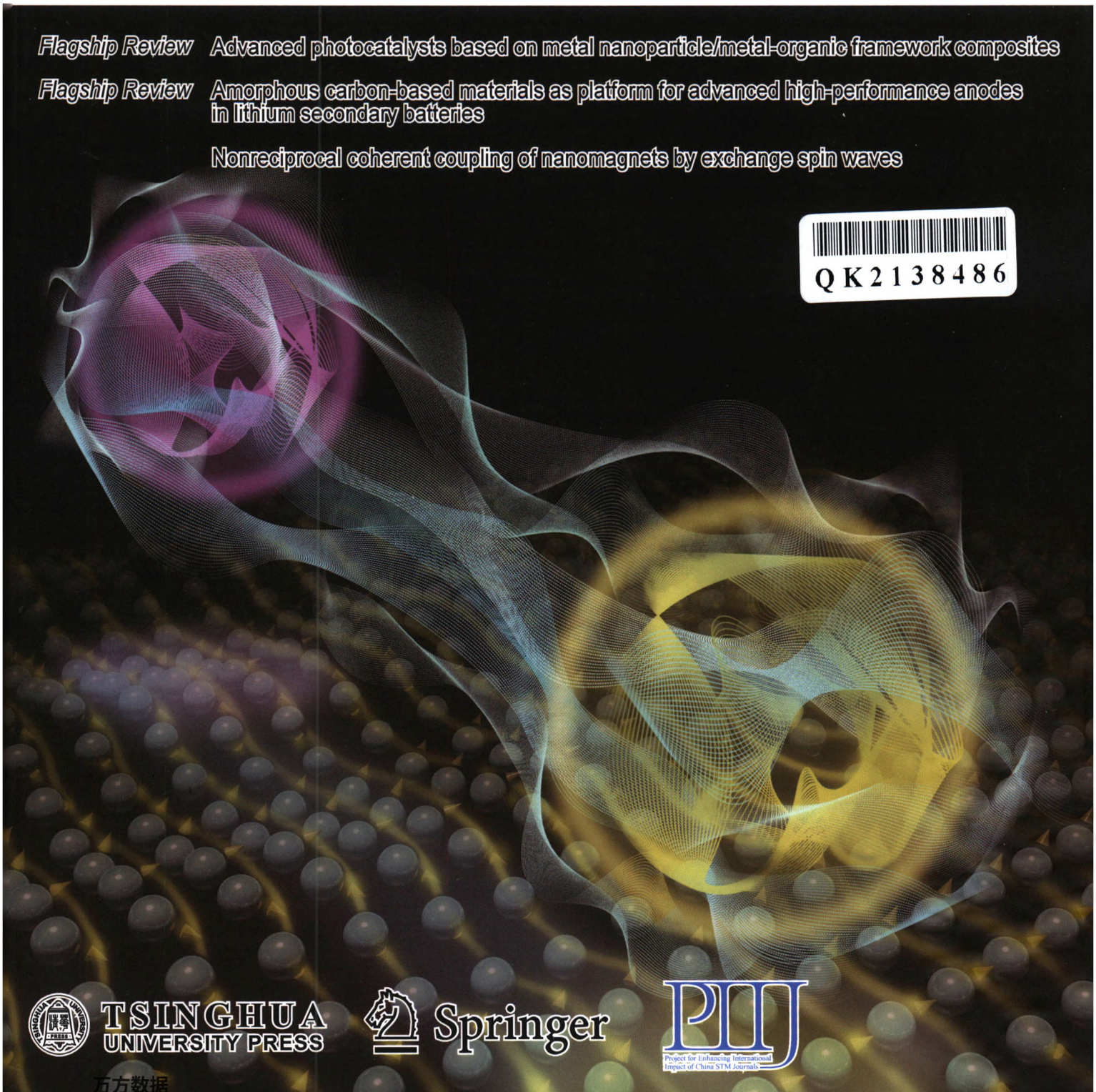
Nano Research

Flagship Review Advanced photocatalysts based on metal nanoparticle/metal-organic framework composites

Flagship Review Amorphous carbon-based materials as platform for advanced high-performance anodes in lithium secondary batteries

Nonreciprocal coherent coupling of nanomagnets by exchange spin waves



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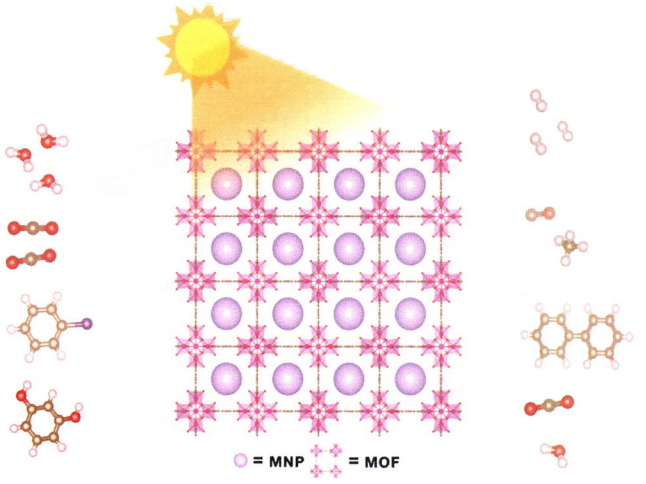
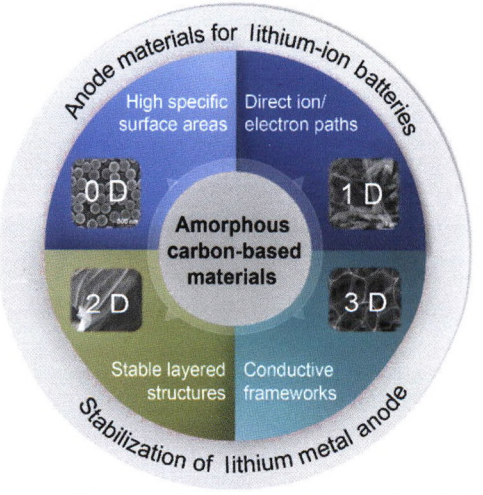
Contents

Flagship Reviews



Two birds with one stone: Metal nanoparticle (MNP)/metal-organic framework (MOF) composites exert superior performance in photocatalysis than their individual counterparts. This review introduced the synthesis strategies of MNP@MOF composites and highlighted their recent progress in photocatalytic hydrogenation, carbon dioxide reduction, organic transformations and degradation of pollutants.



Amorphous carbon-based materials as promising platform for advanced anode materials in the lithium secondary batteries have been summarized in this review.

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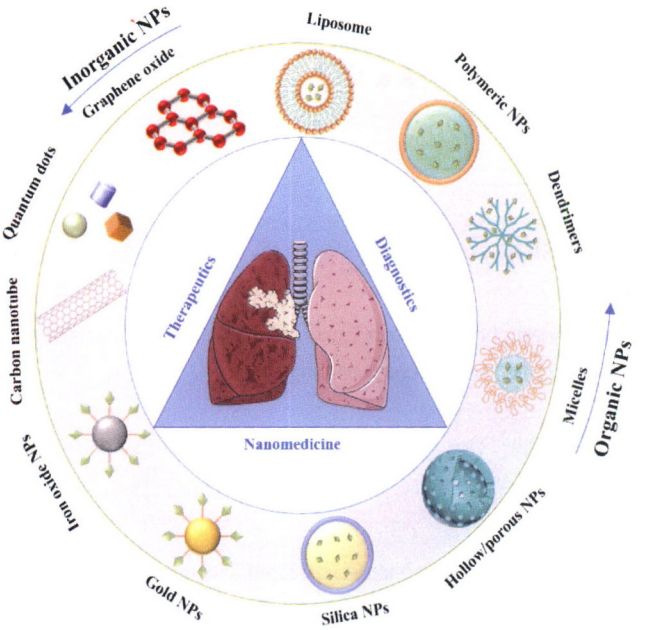
Review Articles

Recent applications and strategies in nanotechnology for lung diseases

Wenhao Zhong, Xinyu Zhang, Yunxin Zeng, Dongjun Lin*, and Jun Wu*

Sun Yat-sen University, China



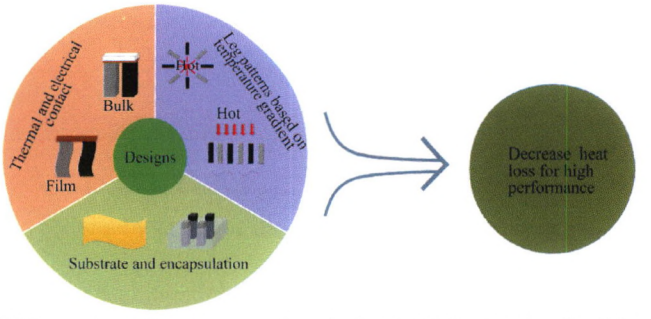
A scheme to illustrate different nanoparticles (NPs), NPs are mainly classified by chemical properties such as organic NPs and inorganic NPs. Nanotechnology can be used as a feasible platform for improving the diagnosis and treatment of lung diseases.

2067–2089

Design of flexible inorganic thermoelectric devices for decrease of heat loss

Defang Ding[1], Fengming Sun[1], Fan Xia[1,*], and Zhiyong Tang[2,3]

[1] China University of Geosciences (CUG), China
[2] National Center for Nanoscience and Technology, China
[3] University of Chinese Academy of Sciences, China



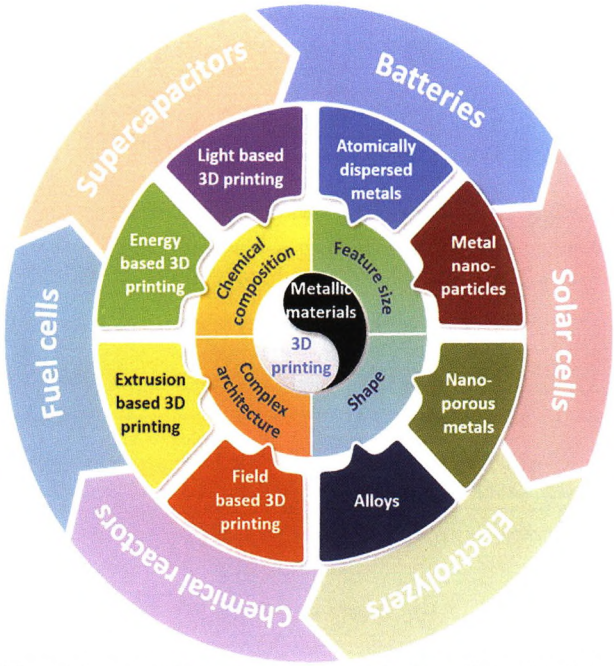
This review focuses on the designs of inorganic flexible thermoelectric (TE) devices consisting of leg patterns based on temperature gradient, thermal and electrical contact, and substrates and encapsulation, which decrease the heat loss for high performance.

2090–2104

3D printing of metal-based materials for renewable energy applications

Shahryar Mooraj[1], Zhen Qi[2], Cheng Zhu[2,*], Jie Ren[1], Siyuan Peng[1], Liang Liu[1], Shengbiao Zhang[1], Shuai Feng[1], Fanyue Kong[1,3], Yanfang Liu[1], Eric B. Duoss[2], Sarah Baker[2], and Wen Chen[1,*]

[1] University of Massachusetts, USA
[2] Lawrence Livermore National Laboratory, USA
[3] Rensselaer Polytechnic Institute, USA



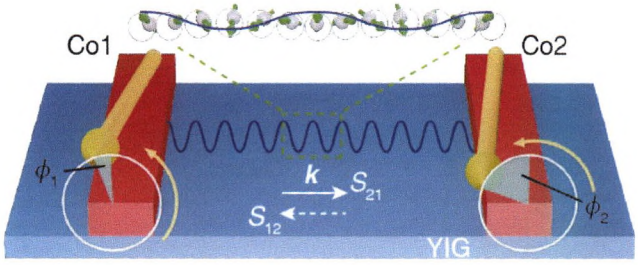
This article summarizes recent advances in three-dimensional (3D) printed metal-based materials developed for renewable energy conversion and storage devices (e.g., fuel cells, solar cells, supercapacitors, and batteries) over the past decade. The focus is on how 3D printing of metal-based materials can be used as active and support materials to improve performance of renewable energy applications.

Research Articles

Nonreciprocal coherent coupling of nanomagnets by exchange spin waves

Hanchen Wang[1], Jilei Chen[1], Tao Yu[2], Chuanpu Liu[1], Chenyang Guo[3], Song Liu[4], Ka Shen[5], Hao Jia[4], Tao Liu[6], Jianyu Zhang[1], Marco A. Cabero Z[4,1], Qiuming Song[4], Sa Tu[1], Mingzhong Wu[6], Xiufeng Han[3], Ke Xia[4], Dapeng Yu[4], Gerrit E. W. Bauer[7,8,9], and Haiming Yu[1,*]

[1] Beihang University, China
[2] Max Planck Institute for the Structure and Dynamics of Matter, Germany
[3] Institute of Physics, University of Chinese Academy of Sciences, Chinese Academy of Sciences, China
[4] Southern University of Science and Technology (SUSTech), China
[5] Beijing Normal University, China
[6] Colorado State University, USA
[7] Delft University of Technology, The Netherlands
[8] Tohoku University, Japan
[9] University of Groningen, The Netherlands

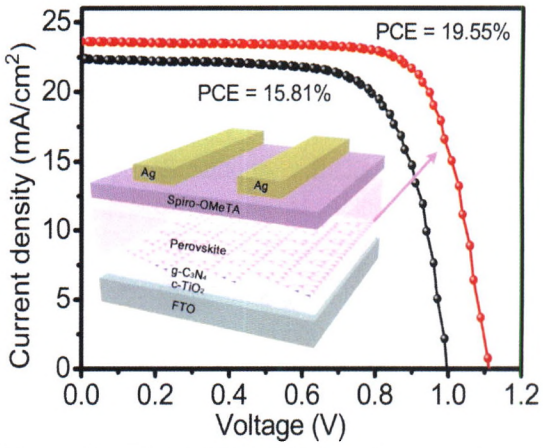


Two distant nanomagnets are unidirectionally phase-locked by propagating spin waves with sub-50 nm wavelengths.

Work function engineering to enhance open-circuit voltage in planar perovskite solar cells by g-C_3N_4 nanosheets

Jian Yang[1,2], Liang Chu[1,*], Ruiyuan Hu[1], Wei Liu[1], Nanjing Liu[1], Yuhui Ma[1], Waqar Ahmad[3], and Xing'ao Li[1,*]

[1] Nanjing University of Posts and Telecommunications, China
[2] Nanjing Institute of Technology, China
[3] Government College Women University, Pakistan

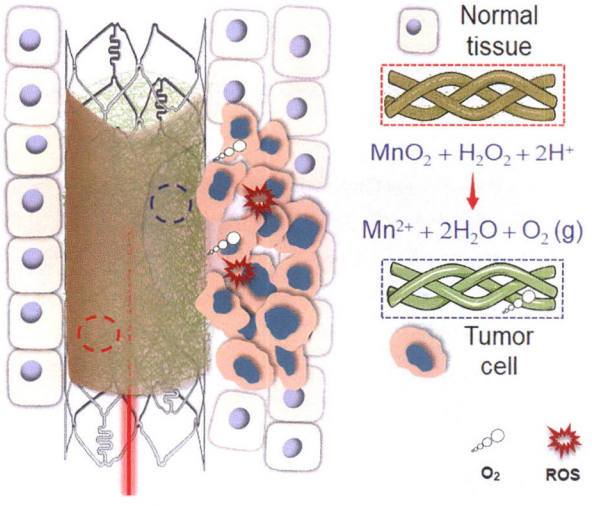


Ultrathin two-dimensional (2D) g-C_3N_4 nanosheets were incorporated into effective perovskite solar cells (PSCs) to tune work function of c-TiO_2 for enhancement of open-circuit voltage.

Mineralized manganese dioxide channel as the stent coating for *in situ* precise tumor navigation

Junyuan Xiao[1], Yiran Zhang[1], Tonglei Fang[1], Tianwen Yuan[3], Qinghua Tian[1], Jingjing Liu[1], Yingsheng Cheng[1,*], Yueqi Zhu[1,*], Liang Cheng[2,*], and Wenguo Cui[1,*]

[1] Shanghai Jiao Tong University, China
[2] Soochow University, China
[3] Dahua Hospital, China

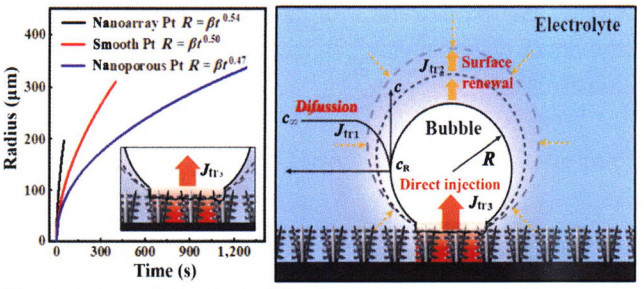


In situ mineralized manganese dioxide coating on Ce6 embedded electrospun fibers covered stent was developed for precise tumor therapy via intraluminal photodynamic therapy (PDT), which could reduce phototoxicity to normal esophageal tissue.

Kinetic study of electrochemically produced hydrogen bubbles on Pt electrodes with tailored geometries

Jingshan Qin[1], Tianhui Xie[1], Daojin Zhou[1], Liang Luo[1,*], Zhengyi Zhang[1], Zhicheng Shang[1], Jiawei Li[1,2], Lagnamayee Mohapatra[1], Jinwen Yu[1], Haijun Xu[1,*], and Xiaoming Sun[1,*]

[1] Beijing University of Chemical Technology, China
[2] Qingdao Institute of Nuokang-Xinqingyuan, China

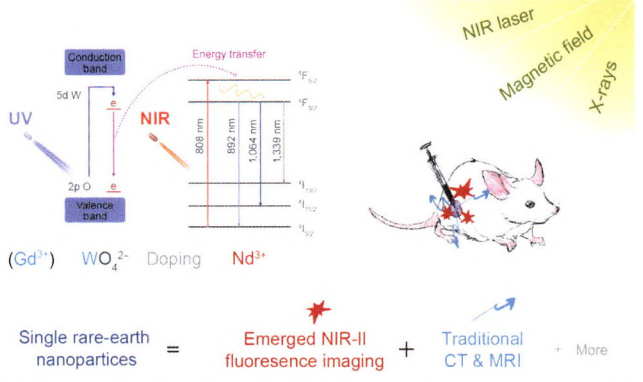


The nanoarray electrode exhibits fastest bubble growth kinetics with highest time coefficient (0.54) and the largest growth coefficient (23.3) compared with smooth electrode and nanoporous electrode. The direct injection of generated gas molecules from the bottom of bubbles at the three phase boundaries is believed to be the key to tailor the bubble wetting states and thus determine the bubble evolution kinetics.

Integrating the second near-infrared fluorescence imaging with clinical techniques for multimodal cancer imaging by neodymiumdoped gadolinium tungstate nanoparticles

Xujiang Yu[1,2], Aodenggerile[2], Zhao Jiang[2], Jianliang Shen[3,4], Zhiqiang Yan[1,*], Wanwan Li[2,*], and Huibin Qiu[2,*]

[1] Southern Medical University Affiliated Fengxian Hospital, China
[2] Shanghai Jiao Tong University, China
[3] Wenzhou Medical University, China
[4] Wenzhou Institute, University of Chinese Academy of Sciences, China

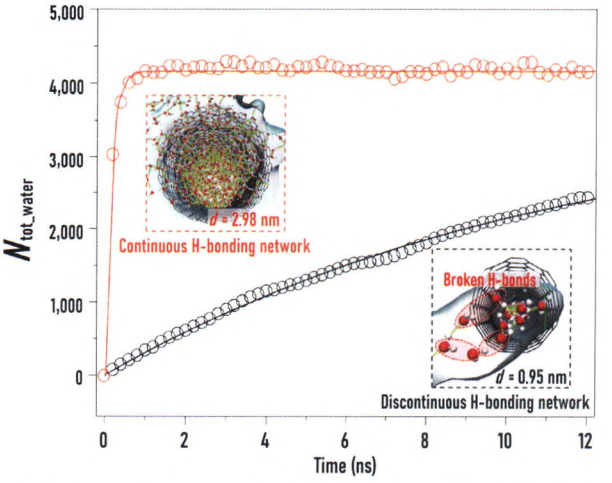


Single neodymium-doped gadolinium tungstate nanoparticles are rationally developed for near-infrared (NIR)-II fluorescence-computed tomography (CT)-magnetic resonance imaging (MRI) associated trimodal imaging of cancer, demonstrating their feature to integrate the newly emerged and traditional clinical techniques for multimodal imaging, as well as X-ray/Cherenkov radiation-to-NIR-II downconversion photoluminescence and relevant cancer diagnosis and treatment.

Continuous water-water hydrogen bonding network across the rim of carbon nanotubes facilitating water transport for desalination

Yaqi Hou[1], Miao Wang[1], Xinyu Chen[1], and Xu Hou[1,2,3,*]

[1] Xiamen University, China
[2] Tan Kah Kee Innovation Laboratory, China
[3] Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China

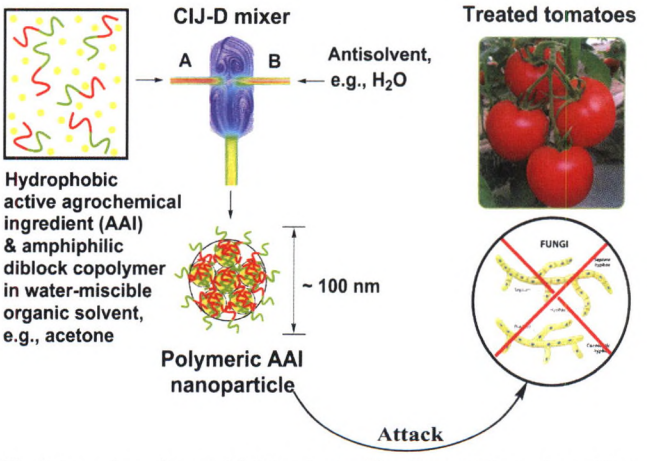


A mechanisms of water-water hydrogen bonding network facilitating water transport through carbon nanotubes at liquid-gas interface is presented and confirmed, which could potentially spark further experimental and theoretical efforts to design and explore advanced carbon nanotube systems with more beneficial performance in water desalination and purification.

Facile pathway to generate agrochemical nanosuspensions integrating super-high load, eco-friendly excipients, intensified preparation process, and enhanced potency

Zhengxi Zhu*, Chuanhua Shao, Yanlin Guo, Jianguo Feng*, Chong Chen, and Haibin Yang

Yangzhou University, China

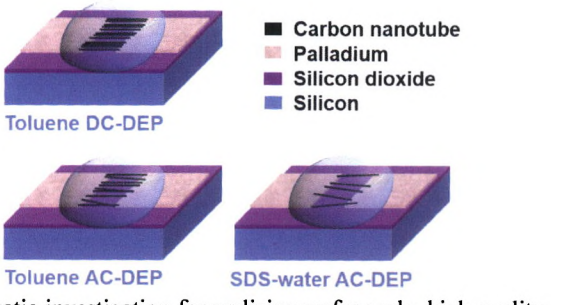


The integration of super-high load, eco-friendly excipients, intensified preparation process, enhanced potency, and reduced dosage creates a promising pathway to generate a green aqueous nanosuspension of agrochemicals.

Principles of carbon nanotube dielectrophoresis

Wenshan Li[1,2,†], Frank Hennrich[1], Benjamin S. Flavel[1], Simone Dehm[1], Manfred Kappes[1], and Ralph Krupke[1,2,*]

[1] IKarlsruhe Institute of Technology, Germany
[2] Technische Universitat Darmstadt, Germany
[†] Present address: Shanghai Jiao Tong University, China

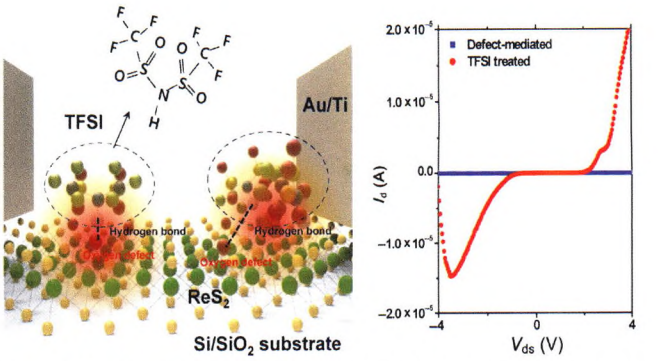


A systematic investigation for realizing wafer-scale, high-quality, and high-efficiency assembly of semiconducting carbon nanotubes using dielectrophoresis is conducted.

Dipole-assisted carrier transport in bis(trifluoromethane) sulfonamide-treated O-ReS_2 field-effect transistor

Jae Young Park[2], SangHyuk Yoo[1], Byeongho Park[2], Taekyeong Kim[3], Young Tea Chun[4], Jong Min Kim[5], Keonwook Kang[1,*], Soo Hyun Lee[2,*], and Seong Chan Jun[1,*]

[1] Yonsei University, Republic of Korea
[2] Korea Institute of Science and Technology, Republic of Korea
[3] Hankuk University of Foreign Studies, Republic of Korea
[4] Korea Maritime and Ocean University, Republic of Korea
[5] University of Cambridge, UK

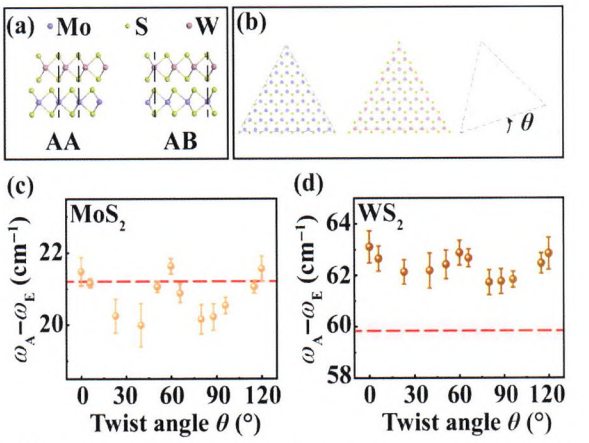


After bis(trifluoromethane)sulfonamide (TFSI) treatment, the drain current of O–ReS_2 field effect transistor (FET) was significantly increased up to 1,113.4 times.

Raman scattering investigation of twisted WS_2/MoS_2 heterostructures: Interlayer mechanical coupling versus charge transfer

Lishu Wu[1], Chunxiao Cong[2,*], Jingzhi Shang[3,*], Weihuang Yang[4], Yu Chen[1], Jiadong Zhou[1], Wei Ai[3], Yanlong Wang[5], Shun Feng[1], Hongbo Zhang[1], Zheng Liu[1], and Ting Yu[1,*]

[1] Nanyang Technological University, Singapore
[2] Fudan University, China
[3] Northwestern Polytechnical University, China
[4] Hangzhou Dianzi University, China
[5] Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

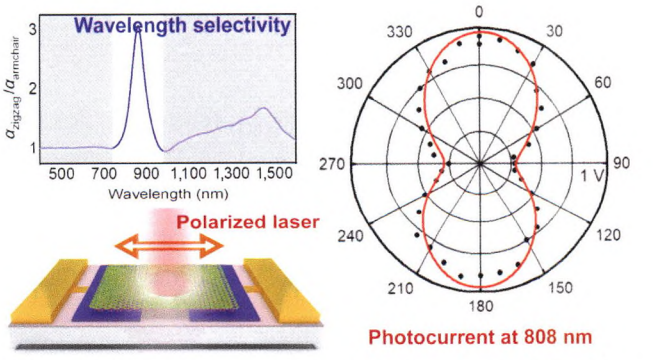


The effects of twist angle on Raman scattering and the underlying interlayer interactions in the twisted WS_2/MoS_2 heterostructures are investigated. The changes of Raman peak separation ($\omega_A - \omega_E$) and $A_{1g}(\Gamma)$ linewidth with the interlayer stacking are found to be correlated with interlayer mechanical coupling and charge transfer effects, confirmed by density functional theory (DFT) calculations and photoluminescence (PL) spectroscopy.

Wavelength-selectivity polarization dependence of optical absorption and photoresponse in SnS nanosheets

Yu Cui[1], Ziqi Zhou[1], Xinghua Wang[2], Xiaoting Wang[1], Zhihui Ren[1], Longfei Pan[1], and Juehan Yang[1,*]

[1] University of Chinese Academy of Sciences, China
[2] Huazhong University of Science and Technology, China

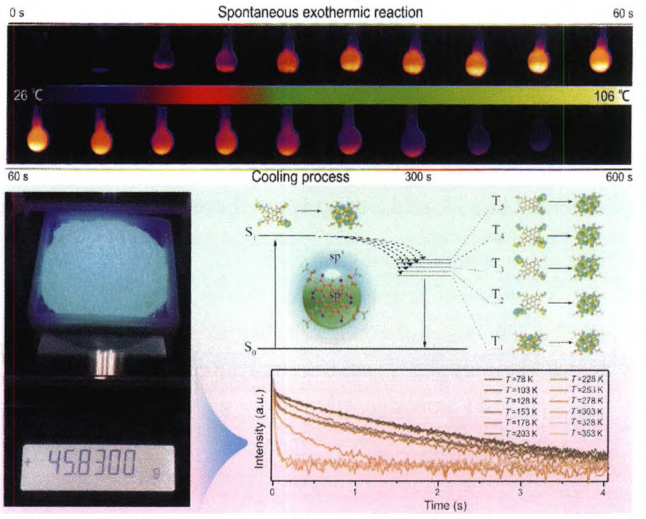


SnS nanosheets present remarkable anisotropy and excellent optoelectronic properties. This research article systematically introduces its anisotropic crystal structure, wavelength-selectivity polarized optical absorption, and polarized optoelectronic characteristics.

Self-exothermic reaction driven large-scale synthesis of phosphorescent carbon nanodots

Shi-Yu Song[1], Lai-Zhi Sui[2], Kai-Kai Liu[1,*], Qing Cao[1], Wen-Bo Zhao[1], Ya-Chuan Liang[1], Chao-Fan Lv[1], Jin-Hao Zang[1], Yuan Shang[1,*], Qing Lou[1], Xi-Gui Yang[1], Lin Dong[1], Kai-Jun Yuan[2], and Chong-Xin Shan[1,*]

[1] Zhengzhou University, China
[2] Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

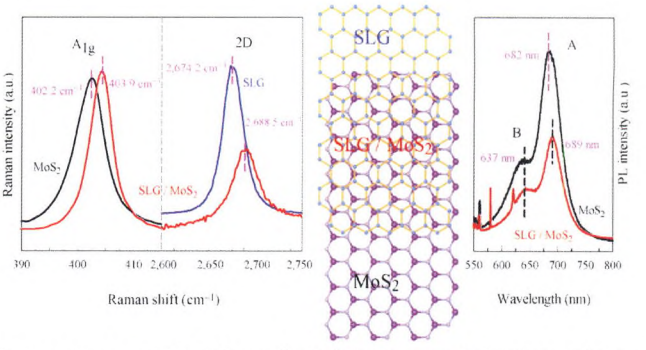


Self-exothermic reaction driven large-scale synthesis of phosphorescent carbon nanodots (CNDs) at room temperature has been demonstrated for the first time, which show comparable properties with that synthesized by solvothermal and microwave method.

Optical identification of interlayer coupling of graphene/MoS_2 van der Waals heterostructures

Mingming Yang[1], Longlong Wang[1], Guofeng Hu[2], Xue Chen[3], Peng Lai Gong[4], Xin Cong[3], Yi Liu[1], Yuanbo Yang[1], Xiaoli Li[1,*], Xiaohui Zhao[1,*], and Xuelu Liu[3,*]

[1] Hebei University, China
[2] Shenzhen University, China
[3] Institute of Semiconductors, Chinese Academy of Sciences, China
[4] Southern University of Science and Technology, China

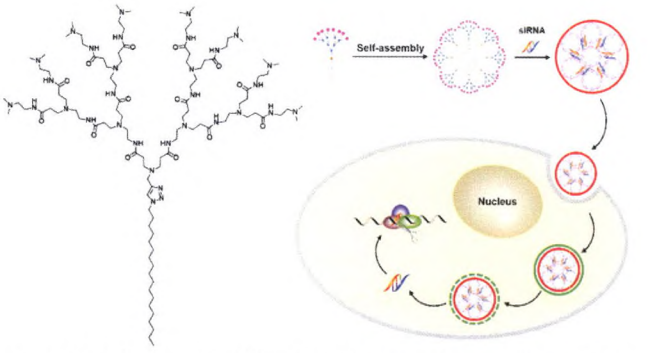


In our paper, we have investigated the Raman behaviors, photoluminescence (PL) emissions and optical contrast (OC) properties of SLG/MoS_2, BLG/MoS_2, and TLG/MoS_2 van der Waals heterostructures (vdWHs). The upshift of the A_{1g} peak of MoS_2 and the upshift the D and 2D peaks of SLG show that the electrons move from MoS_2 to graphene meanwhile inducing the dielectric shielding effect on graphene. The weakened PL intensities and the slight red shift of A peak prove that the electrons move from MoS_2 to graphene and the recombination of hole and electron pairs is blocked in vdWHs.

An ionizable supramolecular dendrimer nanosystem for effective siRNA delivery with a favorable safety profile

Dinesh Dhumal[1], Wenjun Lan[1,2], Ling Ding[1,3], Yifan Jiang[1], Zhenbin Lyu[1,4], Erik Laurini[5], Domenico Marson[5], Aura Tintaru[4], Nelson Dusetti[2], Suzanne Giorgio[1], Juan Lucio Iovanna[2], Sabrina Pricl[5,6], and Ling Peng[1,*]

[1] Equipe Labellisée Ligue Contre le Cancer, France
[2] Centre de Recherche en Cancérologie de Marseille (CRCM), France
[3] Centre de Résonance Magnétique Biologique et Médicale (CRMBM), France
[4] Institut de Chimie Radicalaire (ICR), France
[5] University of Trieste, Italy
[6] University of Lodz, Poland

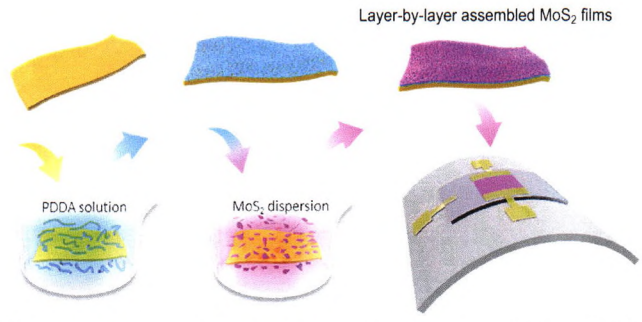


An ionizable amphiphilic dendrimer self-assembles into a supramolecular dendrimer nanosystem and delivers small interfering RNA (siRNA) with potent gene silencing and effective anticancer activity, outperforming the current gold standard delivery agent while providing a favorable safety profile.

High-mobility patternable MoS_2 percolating nanofilms

Xiangxiang Gao, Jun Yin, Gang Bian, Hai-Yang Liu, Chao-Peng Wang, Xi-Xi Pang, and Jian Zhu*

Nankai University, China

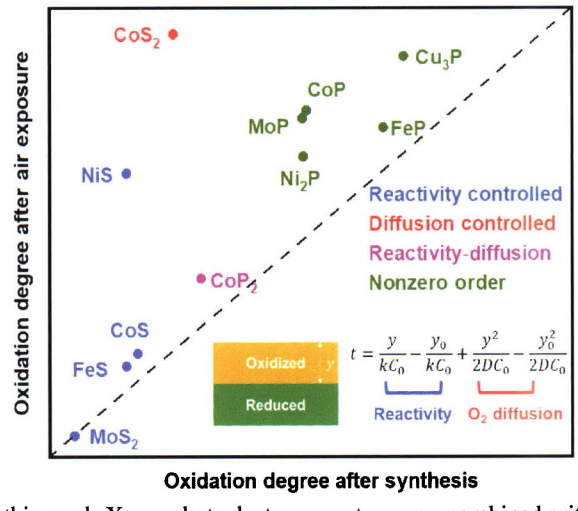


We propose here a layer-by-layer assembly approach for scalable deposition of solution-processed MoS_2 nanofilms on diverse substrates, and demonstrate their applications in flexible high-mobility field-effect transistors gated by ion gels. Such a self-limiting deposition technique affords a precise control over film thicknesses, and allows a facile patterning procedure owing to the conformal deposition on three-dimensional (3D) surfaces.

Surface oxidation of transition metal sulfide and phosphide nanomaterials

Zishan Wu[1], Ling Huang[1,†], Huan Liu[1,‡], Min Li[2], and Hailiang Wang[1,*]

[1] Yale University, USA
[2] Yale West Campus, USA
† Present address: Tsinghua Shenzhen International Graduate School, China
‡ Present address: Inner Mongolia University of Technology, China

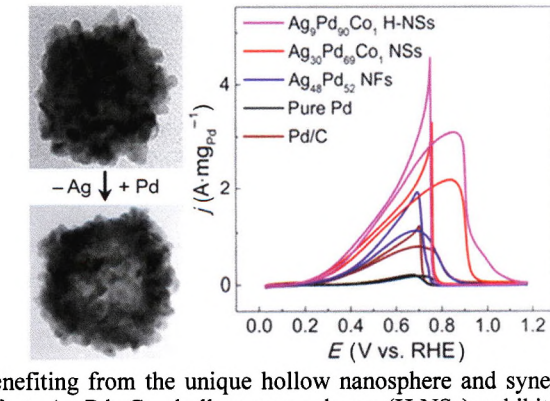


In this work X-ray photoelectron spectroscopy combined with a simplified Deal-Grove model is used to study the surface oxidation kinetics of transition metal phosphide and sulfide nanoparticles in air.

AgPdCo hollow nanospheres electrocatalyst with high activity and stability toward the formate electrooxidation

Qiao Wang, Fuyi Chen*, Quan Tang, Longfei Guo, Tao Jin, Bowei Pan, Junpeng Wang, Zhen Li, Bo Kou, and Weiqi Bian

Northwestern Polytechnical University, China

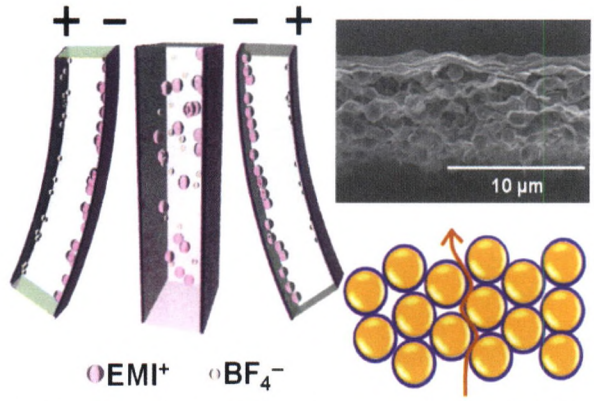


Benefiting from the unique hollow nanosphere and synergistic effect, $Ag_9Pd_{90}Co_1$ hollow nanospheres (H-NSs) exhibited the significantly enhanced activity than commercial Pd/C and most previously reported formate oxidation reaction (FOR) electrocatalysts.

Engineering electrochemical actuators with large bending strain based on 3D-structure titanium carbide MXene composites

Tong Wang[1,2], Tianjiao Wang[1,2], Chuanxin Weng[1], Luqi Liu[1], Jun Zhao[1,2,*], and Zhong Zhang[1,2,*]

[1] National Center for Nanoscience and Technology, China
[2] University of Chinese Academy of Science, China

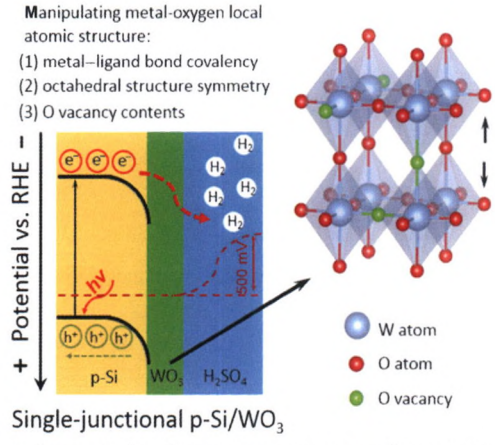


The three-dimensional (3D) architectures formed in MXene/polystyrene-MXene hybrid electrodes generate unimpeded ion pathways for ionic short diffusion and fast injection. An engineering electrochemical actuator based on this hybrid electrode presents large bending strain under low applied voltage.

Manipulating metal-oxygen local atomic structures in singlejunctional p-Si/WO_3 photocathodes for efficient solar hydrogen generation

Wu Zhou[1], Chung-Li Dong[2], Yiqing Wang[1], Yu-Cheng Huang[2], Lingyun He[1], Han-Wei Chang[2], and Shaohua Shen[1,*]

[1] Xi'an Jiaotong University, China
[2] Tamkang University, Taiwan, China

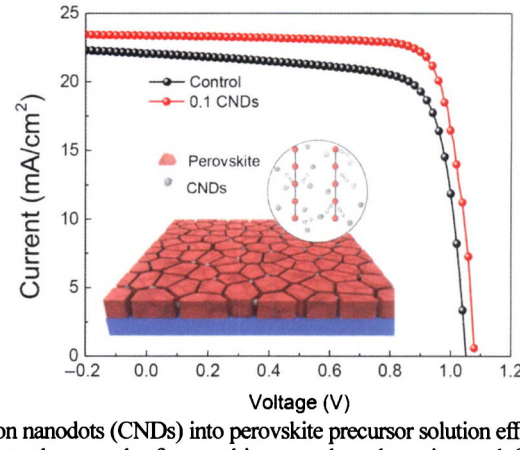


With metal-oxygen local atomic structures well manipulated, the single-junctional p-Si/WO_3 photocathode illustrates the excellent charge carrier separation and transfer ability, with a considerable photovoltage created to effectively drive the water reduction reaction, leading to greatly improved photoelectrochemical (PEC) performances for solar hydrogen generation.

Carbon nanodots enhanced performance of $Cs_{0.15}FA_{0.85}PbI_3$ perovskite solar cells

Yu Gao[1], Wenzhan Xu[1,*], Fang He[1], Pengbo Nie[1], Qingdan Yang[2], Zhichun Si[1], Hong Meng[3], and Guodan Wei[1,*]

[1] Tsinghua University, China
[2] Guangdong University of Technology, China
[3] Peking University, China

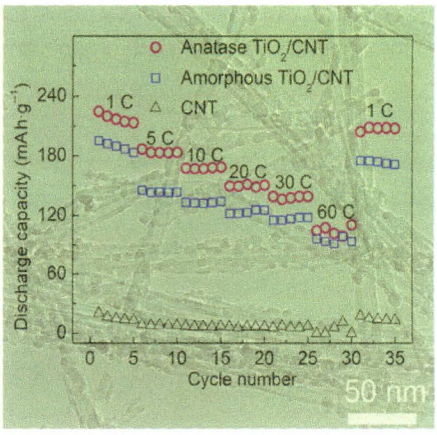


Carbon nanodots (CNDs) into perovskite precursor solution efficiently promote the growth of perovskite crystals and passivates defects by the surface functional groups. The device performs an enhanced efficiency from 17.36% to 20.06% with an inverted device structure of ITO/PTAA/$Cs_{0.15}FA_{0.85}PbI_3$/PC_{61}BM/BCP/Ag.

Free-standing hybrid films comprising of ultra-dispersed titania nanocrystals and hierarchical conductive network for excellent high rate performance of lithium storage

Kunlei Zhu[1,2,*], Chenyu Li[2], Yushuang Jiao[1], Jiawen Zhu[1], Hongtao Ren[3], Yufeng Luo[2], Shoushan Fan[2], and Kai Liu[2,*]

[1] Qufu Normal University, China
[2] Tsinghua University, China
[3] Liaocheng University, China

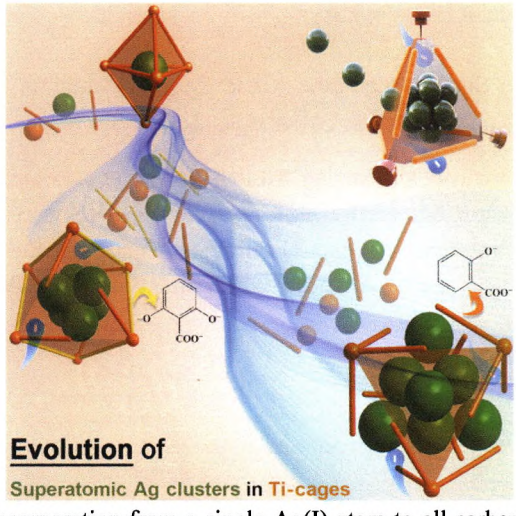


A free-standing anatase TiO_2 nanocrystal/carbon nanotube (CNT) film is reported using a simple and scalable sol-gel method, followed by calcination and comprises ultra-small TiO_2 nanocrystals (~ 5.9 nm) and super-aligned CNTs. Without requiring electrode fabrication and additional conductive agents and binders, the film is directly used as an anode in Li-ion batteries, and delivers a high discharge capacity of ~ 105 $mAh \cdot g^{-1}$ at high rate of 60 C (1 C = 170 $mA \cdot g^{-1}$) and excellent cycling performance over 2,500 cycles at 30 C.

Evolution of all-carboxylate-protected superatomic Ag clusters confined in Ti-organic cages

Xi-Ming Luo[1], Chun-Hua Gong[1], Xi-Yan Dong[1,2], Lei Zhang[3,*], and Shuang-Quan Zang[1,*]

[1] Zhengzhou University, China
[2] Henan Polytechnic University, China
[3] Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, China

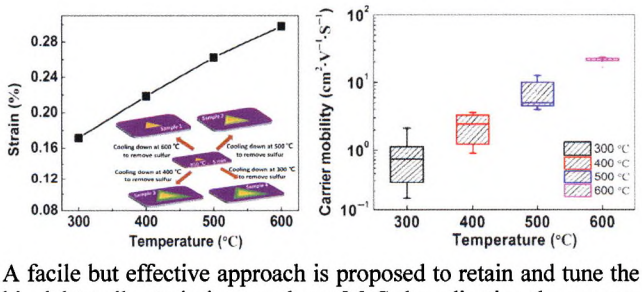


The incorporation from a single Ag(I) atom to all-carboxylate-protected superatomic Ag clusters with different sizes was successfully achieved by breaking or expanding Ti-organic cages, which for the first time witnessed the size evolution of intriguing cluster@cage complexes.

Carrier mobility tuning of MoS_2 by strain engineering in CVD growth process

Yongfeng Chen[1], Wenjie Deng[1], Xiaoqing Chen[1,*], Yi Wu[1], Jianwei Shi[3], Jingying Zheng[2], Feihong Chu[1], Beiyun Liu[1], Boxing An[1], Congya You[1], Liying Jiao[2], Xinfeng Liu[3], and Yongzhe Zhang[1,*]

[1] Beijing University of Technology, China
[2] Tsinghua University, China
[3] National Center for Nanoscience and Technology, China

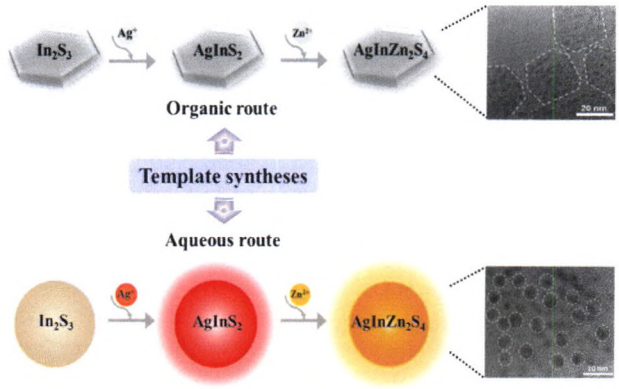


A facile but effective approach is proposed to retain and tune the biaxial tensile strain in monolayer MoS_2 by adjusting the process of the chemical vapor deposition (CVD). Through the strain control, the MoS_2 mobility was increased by two orders from ~ 0.15 to ~ 23 $cm^2 \cdot V^{-1} \cdot s^{-1}$, as confirmed by measured electrical properties.

Template synthesis of silver indium sulfide based nanocrystals performed through cation exchange in organic and aqueous media

Na Gao[1], Rubo Zhang[1], Bingkun Chen[1,2,*], Jinfeng Zhang[1], Xiaoling Zhang[1], and Andrey L. Rogach[2]

[1] Beijing Institute of Technology, China
[2] City University of Hong Kong, Hong Kong, China



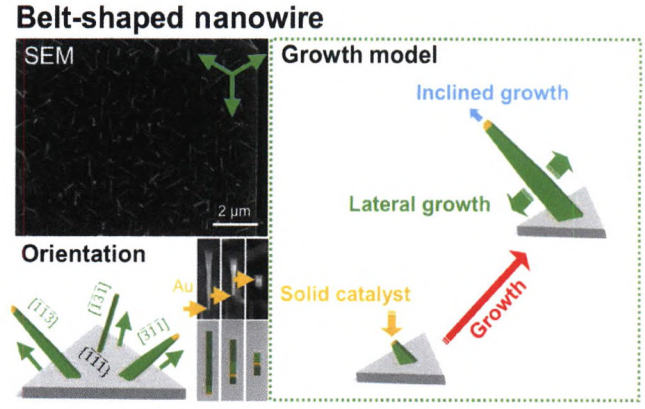
Ternary $AgInS_2$ and quaternary $AgInZn_2S_4$ nanocrystals (NCs) were fabricated through template synthesis starting from In_2S_3 template in both organic and aqueous media. Furthermore, the as-synthesized aqueous red-emitting $AgInZn_2S_4$ NCs have low cytotoxicity, and cancer cell imaging was realized by using the aqueous $AgInZn_2S_4$ NCs as labeling agent.

2321–2329

Axiotaxy driven growth of belt-shaped InAs nanowires in molecular beam epitaxy

Qiang Sun[1], Dong Pan[2], Xutao Zhang[3,4], Jianhua Zhao[2], Pingping Chen[4], Wei Lu[4], and Jin Zou[1,*]

[1] University of Queensland, Australia
[2] Institute of Semiconductors, Chinese Academy of Sciences, China
[3] Northwestern Polytechnical University, China
[4] Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China



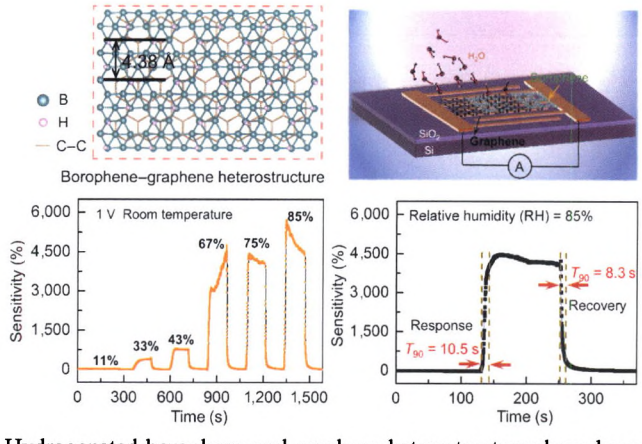
Through achieving a unique growth direction using solid catalysts, belt-shaped InAs nanowires have been successfully grown in molecular beam epitaxy.

2330–2336

Borophene–graphene heterostructure: Preparation and ultrasensitive humidity sensing

Chuang Hou, Guo'an Tai*, Bo Liu, Zenghui Wu, and Yonghe Yin

Nanjing University of Aeronautics and Astronautics, China



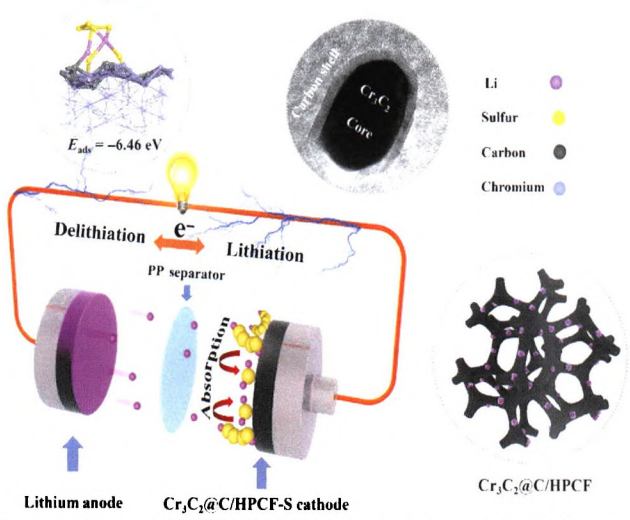
Hydrogenated borophene and graphene heterostructures have been synthesized by heating the mixture of sodium borohydride and graphene. A borophene–graphene heterostructured humidity sensor was fabricated to demonstrate its high-performance device application. The sensitivity of the sensor is highest among all the reported chemiresistive sensors based on two-dimensional (2D) materials.

2337–2344

Microwave-assisted synthesis of Cr_3C_2@C core shell structure anchored on hierarchical porous carbon foam for enhanced polysulfide adsorption in Li-S batteries

Xierong Zeng[1,*], Jianxin Tu[2], Shuangshuang Chen[3], Shaozhong Zeng[4], Qi Zhang[5], Jizhao Zou[1], and Kezhi Li[2,*]

[1] Shenzhen University, China
[2] Northwestern Polytechnical University, China
[3] Anhui University of Technology, China
[4] Shenzhen Technology University, China
[5] Basque Center for Materials, Applications and Nanostructures, Spain

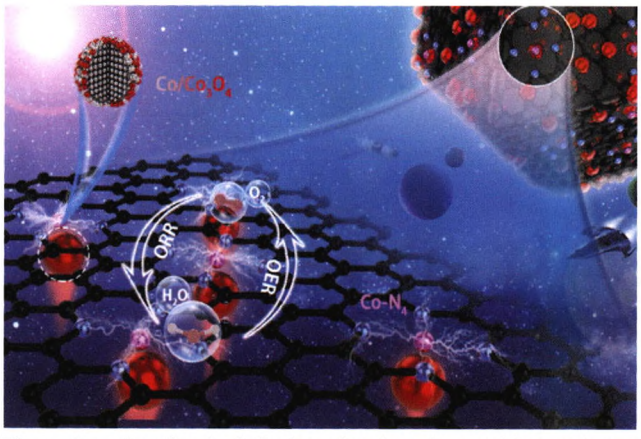


A new bi-functional sulfur host material Cr_3C_2@C/HPCF was synthesized by a simple *in situ* sol-gel and microwave heating method.

Tuning the dual-active sites of ZIF-67 derived porous nanomaterials for boosting oxygen catalysis and rechargeable Zn-air batteries

Zeyi Zhang[1], Yangyang Tan[1], Tang Zeng[1], Liyue Yu[1], Runzhe Chen[1], Niancai Cheng[1,*], Shichun Mu[2,*], and Xueliang Sun[3,*]

[1] Fuzhou University, China
[2] Wuhan University of Technology, China
[3] University of Western Ontario, Canada

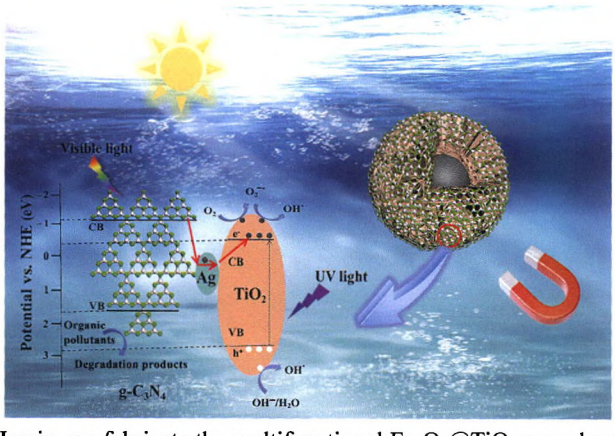


Through tuning the dual-Co-based active sites and internal pore structure of carbon nanomaterial derived from zeolite imidazole framework-67 (ZIF-67), the Co_3O_4-Co@NC nanocatalysts prepared by *in-situ* $NaBH_4$ reduction are excellent oxygen reduction/evolution reaction (ORR/OER) bifunctional catalysts.

Fabrication of magnetically recyclable yolk-shell Fe_3O_4@TiO_2 nanosheet/Ag/g-C_3N_4 microspheres for enhanced photocatalytic degradation of organic pollutants

Yan Lv[1], Lin Yue[1], Imran Mahmood Khan[1], You Zhou[1], Wenbo Cao[1], Sobia Niazi[1], and Zhouping Wang[1,2,*]

[1] Jiangnan University, China
[2] Dalian Polytechnic University, China

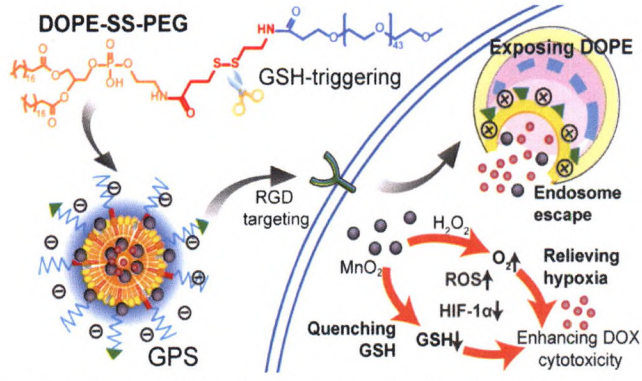


Herein, we fabricate the multifunctional Fe_3O_4@TiO_2 nanosheet/Ag/g-C_3N_4 (Fe_3O_4@ns-TiO_2/Ag/g-C_3N_4) photocatalysts with well-designed hierarchical yolk-shell structure. Interestingly, the composite photocatalysts exhibit excellent photocatalytic activity and superior magnetic recyclability, which is significant for the future environmental governance issues.

A glutathione-triggered precision explosive system for improving tumor chemosensitivity

Yuanyuan Nie, Yurui Xu*, Ya Gao, Jielei He, Lei Sun, Jianmei Chen, Yushuang Cui*, Haixiong Ge*, and Xinghai Ning*

Nanjing University, China



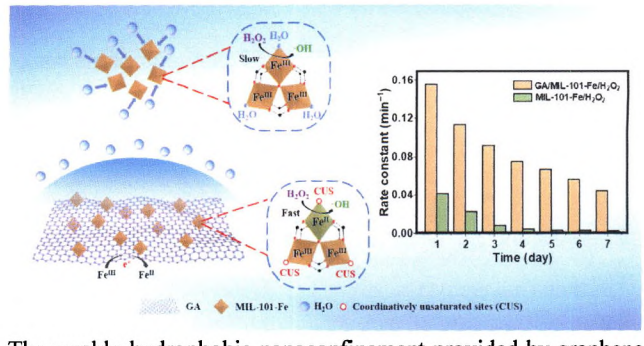
A glutathione (GSH)-triggered precision-bomb system, named precision explosive system (GPS)/D, is developed for simultaneously improving circulation stability, tumor specificity and doxorubicin (DOX) chemosensitivity. GPS/D not only exhibits good serum stability, but displays GSH-triggered intracellular drug release, and consequently relieving hypoxia and quenching GSH, resulting in explosive anticancer effects.

2372–2382

Weakly hydrophobic nanoconfinement by graphene aerogels greatly enhances the reactivity and ambient stability of reactivity of MIL-101-Fe in Fenton-like reaction

Yuwei Zhang[1], Fei Liu[1], Zhichao Yang[2], Jieshu Qian[1,2,*], and Bingcai Pan[2]

[1] Nanjing University of Science and Technology, China
[2] Nanjing University, China



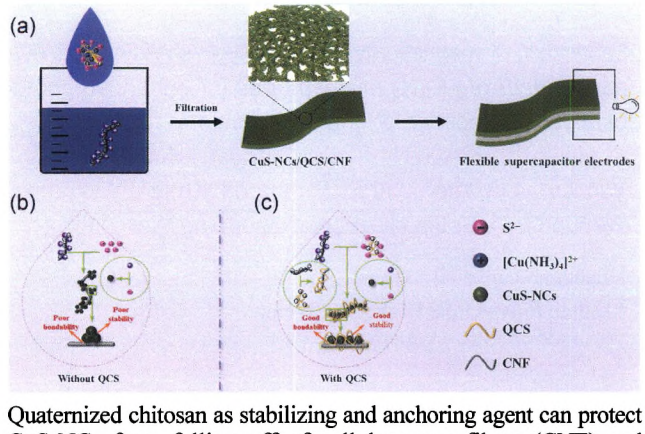
The weakly hydrophobic nanoconfinement provided by graphene aerogels not only greatly improves the catalytic reactivity of MIL-101-Fe in Fenton reaction for the degradation of various organic pollutants, but also significantly enhances its ambient stability of reactivity in humid environment.

2383–2389

Quaternized chitosan-assisted *in situ* synthesized CuS/cellulose nanofibers conductive paper for flexible electrode

Xiujie Huang[1], Bichong Luo[1], Chuanfu Liu[1], Linxin Zhong[1], Dongdong Ye[2], and Xiaoying Wang[1,*]

[1] South China University of Technology, China
[2] Wuyi University, China



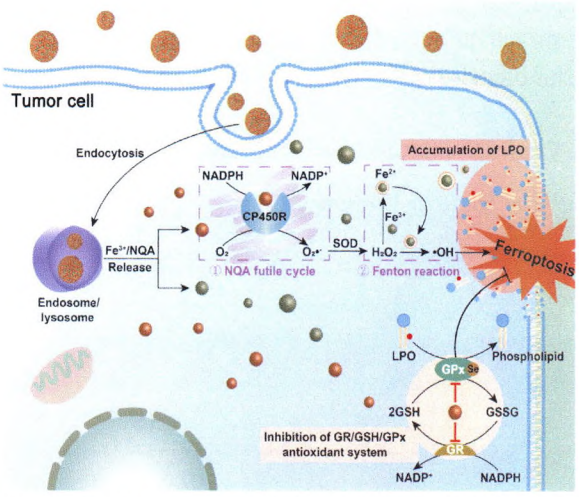
Quaternized chitosan as stabilizing and anchoring agent can protect CuS-NCs from falling off of cellulose nanofibers (CNF) and improve electrochemical performance when CNF-based paper acted as flexible electrode for supercapacitor.

2390–2397

Versatile iron-vitamin K_3 derivative-based nanoscale coordination polymer augments tumor ferroptotic therapy

Zhicheng Zhang, Yawen Ding, Jinbiao Li, Li Wang, Xiaoyan Xin*, Jing Yan*, Jinhui Wu, Ahu Yuan, and Yiqiao Hu*

Nanjing University, China

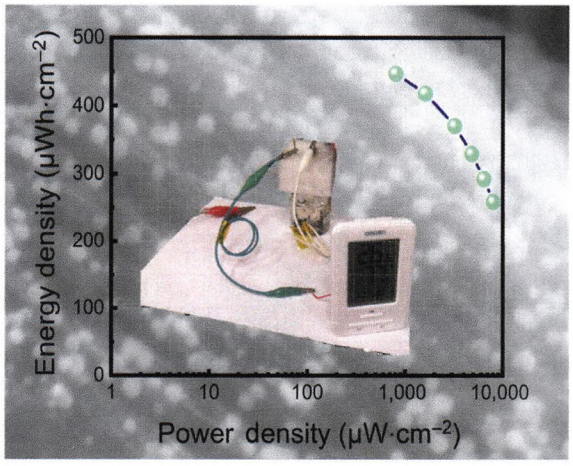


In this study, nanoscale coordination polymer Fe-NQA particles (Fe-NQA NPs) were constructed to synergistically induce ferroptotic therapy, prevent metastasis and overcome radioresistance.

A facile strategy of *in-situ* anchoring of Co_3O_4 on N doped carbon cloth for an ultrahigh electrochemical performance

Junlin Lu[1], Jien Li[1], Jing Wan[1], Xiangyu Han[1], Peiyuan Ji[1], Shuang Luo[1], Mingxin Gu[2], Dapeng Wei[2,*], and Chenguo Hu[1,*]

[1] Chongqing University, China
[2] Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences, China

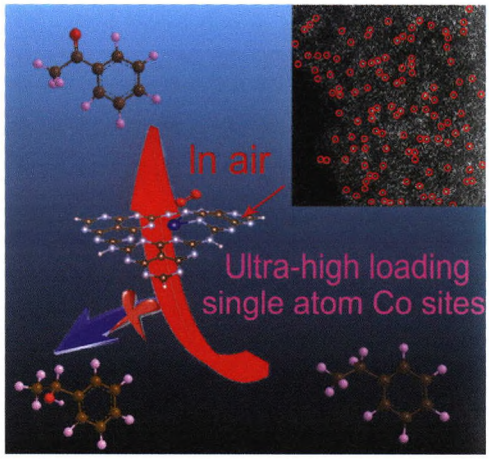


In-situ anchoring Co_3O_4 nanoparticles on N doped carbon cloth exhibits high-energy density for future energy storage and supply.

Cobalt single atom site catalysts with ultrahigh metal loading for enhanced aerobic oxidation of ethylbenzene

Yu Xiong[1,2], Wenming Sun[3], Yunhu Han[4], Pingyu Xin[2], Xusheng Zheng[5], Wensheng Yan[5], Juncai Dong[6], Jian Zhang[2], Dingsheng Wang[2,*], and Yadong Li[2]

[1] Central South University, China
[2] Tsinghua University, China
[3] China Agricultural University, China
[4] Northwestern Polytechnical University, China
[5] University of Science and Technology of China, China
[6] Institute of High Energy Physics, Chinese Academy of Sciences, China

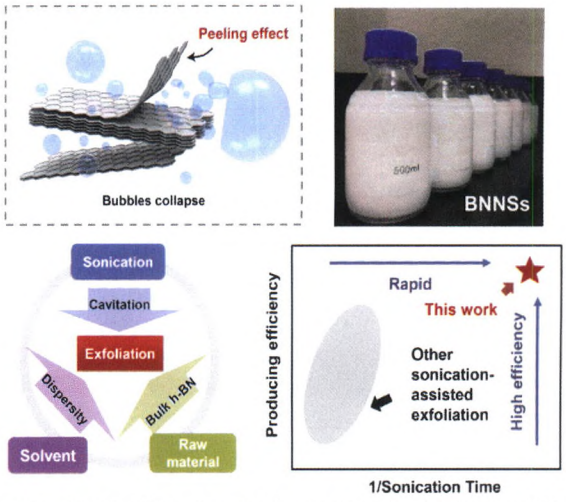


Cobalt single atom site catalysts anchored on carbon nitride (Co SACs) with ultrahigh metal loading (23.58 wt.%) were synthesized in this work. Co SACs can be used as efficient catalysts for selective oxidation of aromatic hydrocarbons with air as the only oxidant.

Rapid, high-efficient and scalable exfoliation of high-quality boron nitride nanosheets and their application in lithium-sulfur batteries

Yu Chen, Qi Kang, Pingkai Jiang, and Xingyi Huang*

Shanghai Jiao Tong University, China

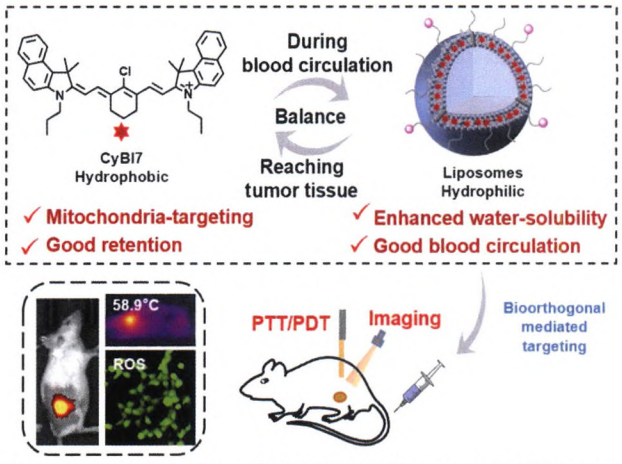


A rapid and high-efficient sonication-assisted liquid-phase exfoliation method for large scale preparation of high-quality boron nitride nanosheets (BNNSs) is reported. The as-prepared BNNSs are applied for modified separators in lithium-sulfur batteries.

Liposome trade-off strategy in mitochondria-targeted NIR-cyanine: Balancing blood circulation and cell retention for enhanced antitumor phototherapy *in vivo*

Xianghan Zhang[1], Sumei Zhao[1], Zhiqing Gao[1], Jialin Zhou[1], Yuqiong Xia[1], Jie Tian[1,2,*], Changhong Shi[3,*], and Zhongliang Wang[1,*]

[1] Xidian University, China
[2] Institute of Automation, Chinese Academy of Sciences, China
[3] Fourth Military Medical University, China



Liposomal nanoplatform CyBI7-LPs offers a trade-off strategy in mitochondria-targeted cyanine for balancing *in vivo* blood circulation and cell retention for cyanine. Bioorthogonal-mediated nanoplatform CyBI7-LPB benefits high tumor-to-background ratio (TBR) tumor imaging and exhibits as an efficient imaging-guided anti-tumor therapeutic strategy.

Dual synergetic catalytic effects boost hydrogen electric oxidation performance of $Pd/W_{18}O_{49}$

Lingxin Peng[1,2], Han Tian[1,2], Xiangzhi Cui[1,2,*], Liang Su[3], Ge Meng[1,2], Zhonghua Ma[4], Shaowen Cao[5], and Jianlin Shi[1,2,*]

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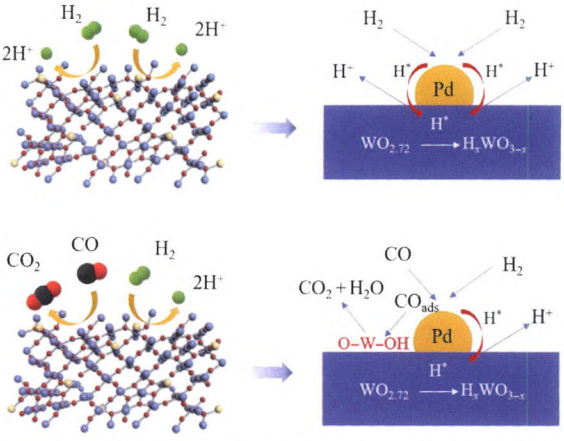
[2] University of Chinese Academy of Sciences, China
[3] Huazhong University of Science and Technology (HUST), China
[4] Donghua University, China
[5] Wuhan University of Technology, China

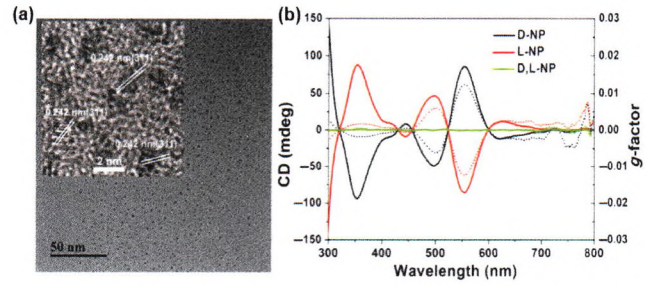


The synthesized Pd-$WO_{2.72}$-L by Xenon light reduction exhibits the excellent hydrogen oxidation reaction (HOR) activity and anti-CO poisoning performance due to the dual synergetic catalytic effects between Pd and $WO_{2.72}$.

Metabolic profile of chiral cobalt oxide nanoparticles *in vitro* and *in vivo*

Si Li, Liwei Xu, Meiru Lu, Maozhong Sun, Liguang Xu, Changlong Hao*, Xiaoling Wu*, Chuanlai Xu*, and Hua Kuang

Jiangnan University, China

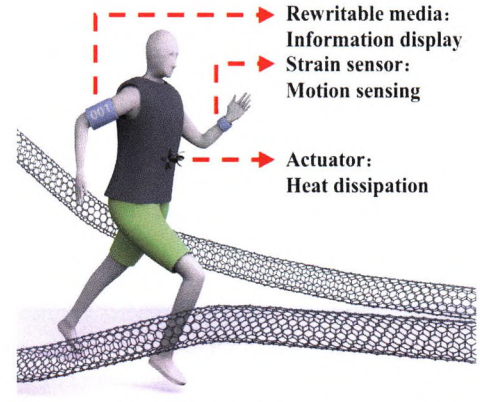


Chiral cobalt oxide nanoparticles (Co_3O_4 NPs) were prepared with D- or L-cysteine. A metabolic analysis indicated that low chiroptical activity nanomaterials would not affect the metabolism and kinetics under physiological conditions.

Monolithic superaligned carbon nanotube composite with integrated rewriting, actuating and sensing multifunctions

Peidi Zhou[1,2], Wei Zhang[1,2], Luzhuo Chen[1,2,*], Jian Lin[1,2], Zhiling Luo[1,2], Changhong Liu[3], and Kaili Jiang[3]

[1] Fujian Normal University, China
[2] Fujian Provincial Collaborative Innovation Center for Advanced High-Field Superconducting Materials and Engineering, China
[3] Tsinghua University, China



A monolithic superaligned carbon nanotube composite is proposed, which can leverage three different functions. The composite can be used as a rewritable medium, an actuator or a strain sensor. Two smart wearable devices are demonstrated as applications, which realize the functions of human-motion detection and rewritable information display simultaneously.

Erratum to: Surface oxidation of transition metal sulfide and phosphide nanomaterials
(https://doi.org/10.1007/s12274-020-3219-5)

Erratum to: Mineralized manganese dioxide channel as the stent coating for *in situ* precise tumor navigation
(https://doi.org/10.1007/s12274-020-3114-0)

Erratum to: Isolated atomic catalysts encapsulated in MOF for ultrafast water pollutant treatment
(https://doi.org/10.1007/s12274-020-3138-5)

Erratum to: Ultrathin flexible InGaZnO transistor for implementing multiple functions with a very small circuit footprint
(https://doi.org/10.1007/s12274-020-3074-4)

Erratum to: Principles of carbon nanotube dielectrophoresis
(https://doi.org/10.1007/s12274-020-3183-0)

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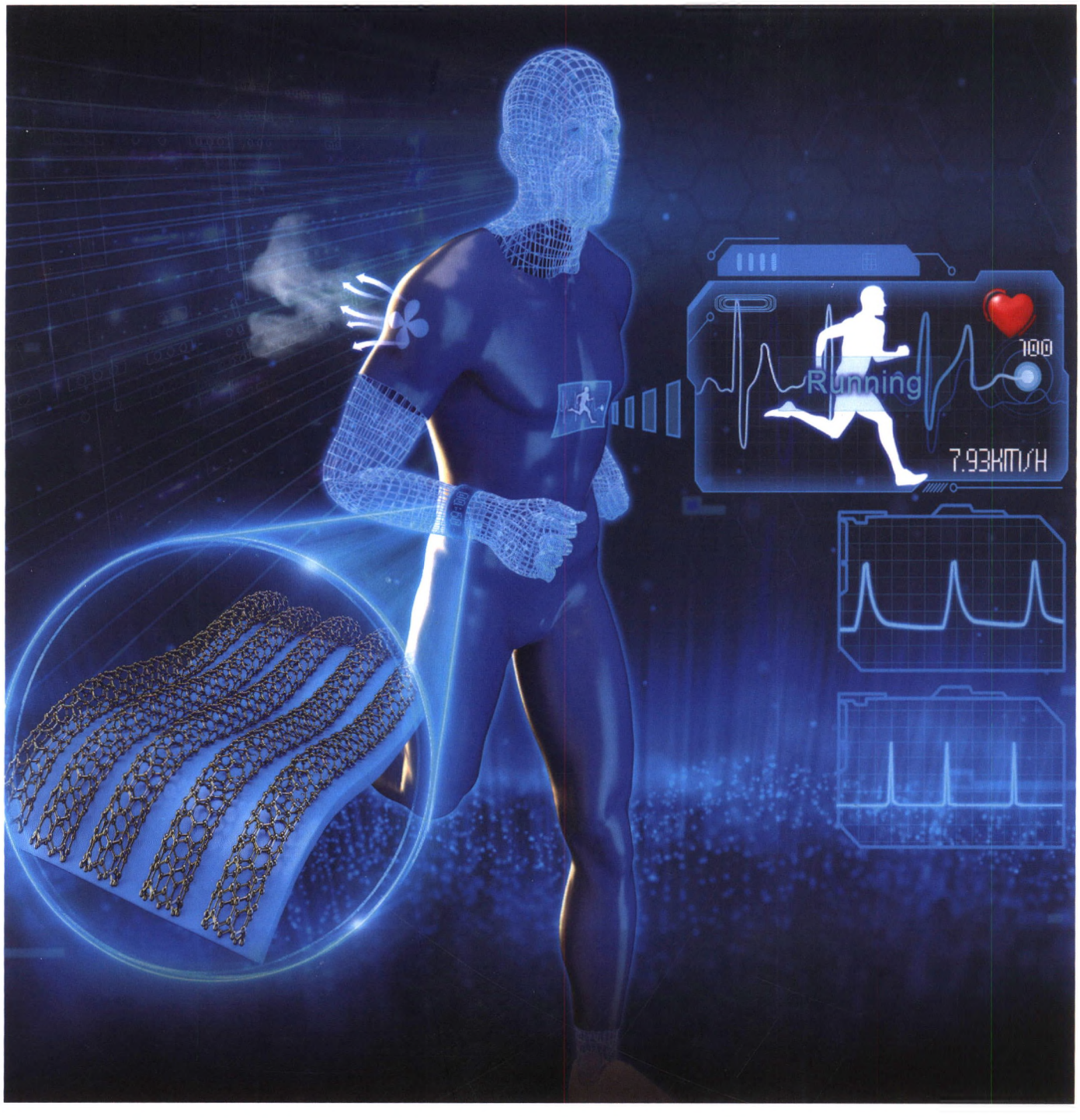

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