August · 2021
Volume 14 · Number 8

Nano Research

Perspective Review Advances of CNT-based systems in thermal management

Biomimetic nanomedicine toward personalized disease theranostics

Joule-heated carbonized melamine sponge for high-speed absorption of viscous oil spills

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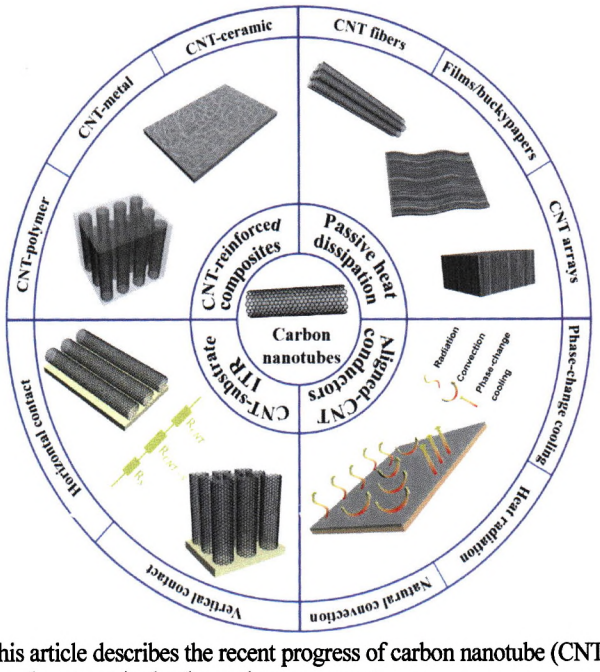
Nano Research
Vol. 14, No. 8, August 2021
ISSN 1998-0124 CN 11-5974/O4

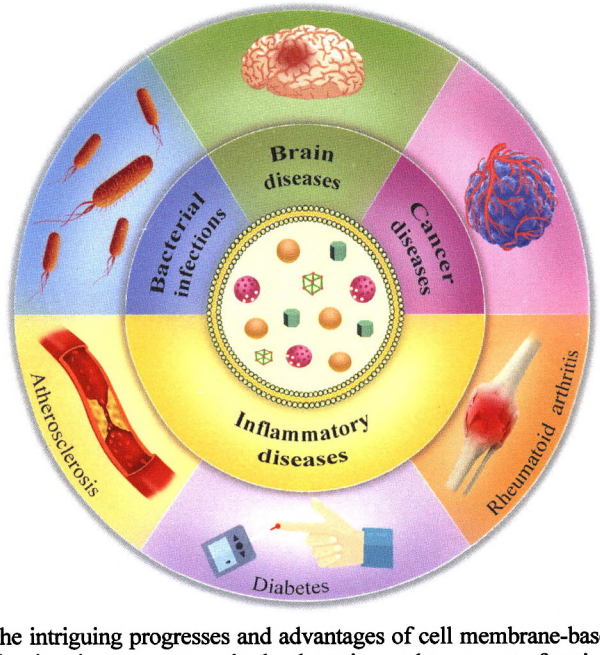
Contents

Perspective Review



This article describes the recent progress of carbon nanotube (CNT)-based systems in the thermal management.

Review Articles



The intriguing progresses and advantages of cell membrane-based biomimetic nanosystems in the detection and treatment of various diseases over the past five years are overviewed.

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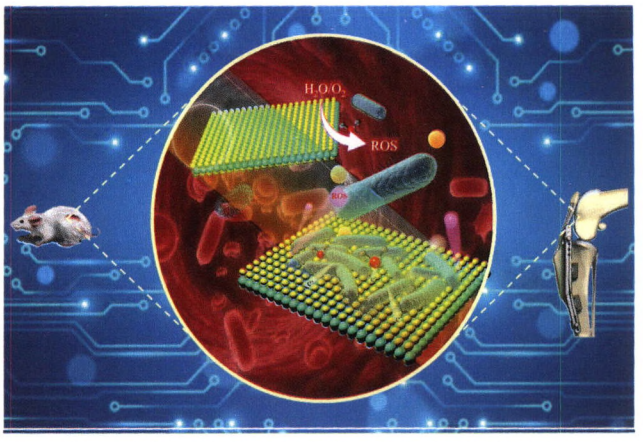
Shining light on transition metal sulfides: New choices as highly efficient antibacterial agents

Hecheng Han[1], Jingjing Yang[1], Xiaoyan Li[1], Yuan Qi[1], Zhengyi Yang[1], Zejun Han[1], Yanyan Jiang[1,2,3,*], Martina Stenzel[4], Hui Li[1], Yixin Yin[5,*], Yi Du[5], Jiurong Liu[1], and Fenglong Wang[1,3,*]

[1] Shandong University, China
[2] Suzhou Institute of Shandong University, China
[3] ShenZhen Research Institute of Shandong University, China
[4] University of New South Wales, Australia
[5] Jinan Stomatology Hospital, China

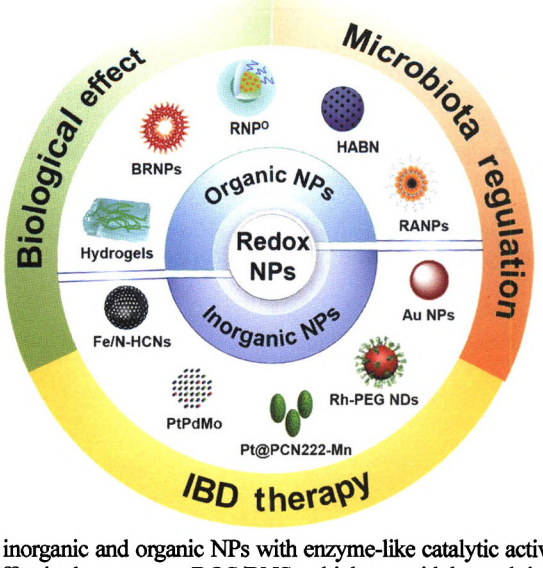


The antibacterial mechanisms and effective strategies for construction transition metal sulfides based materials with high-efficiency antibacterial properties have been reviewed.

Redox-active nanoparticles for inflammatory bowel disease

Qinjuan Ren, Si Sun, and Xiao-Dong Zhang*

Tianjin University, China



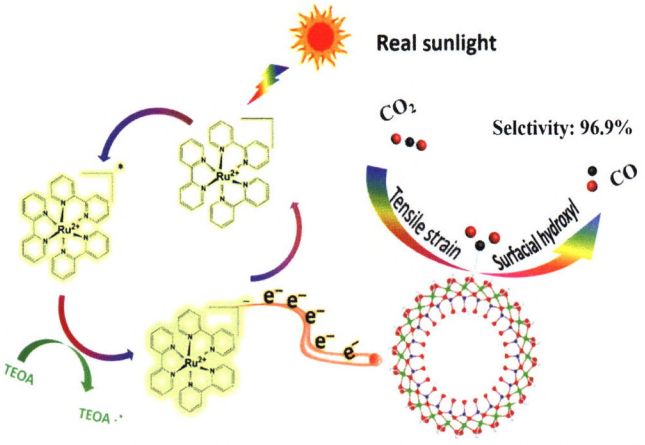
Both inorganic and organic NPs with enzyme-like catalytic activities can effectively scavenge ROS/RNS, which are widely exploited in treatment of IBD and regulation of gut microbiota.

Research Articles

Lattice-strained nanotubes facilitate efficient natural sunlight-driven CO_2 photoreduction

Shujie Liang[1], Xueming Liu[1], Zuqi Zhong[1], Bin Han[1], Xiaohui Zhong[1], Weiyi Chen[1], Kainan Song[1], Hong Deng[1,2,*], and Zhang Lin[1,2]

[1] South China University of Technology, China
[2] The Key Laboratory of Pollution Control and Ecosystem Restoration in Industry Clusters (Ministry of Education), China



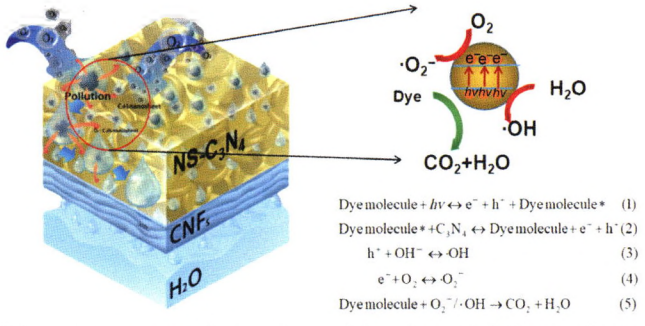
$Ni_2(OH)(PO_4)$ nanotubes multi-synergetic effects of surface-OH and the lattice strain enable a substantially enhanced performance for CO_2 photocatalysis in pure or diluted CO_2, which could afford an accumulated CO of ca. 26.8 μmol with 96.9% CO selectivity.

2558–2567

High flux photocatalytic self-cleaning nanosheet C_3N_4 membrane supported by cellulose nanofibers for dye wastewater purification

Lilong Zhang[1,2], Ge Meng[1], Guifang Fan[1], Keli Chen[2], Yulong Wu[1,3,*], and Jian Liu[4]

[1] Tsinghua University, China
[2] Jilin University, China
[3] Xinjiang University, China
[4] Qingdao University of Science and Technology, China



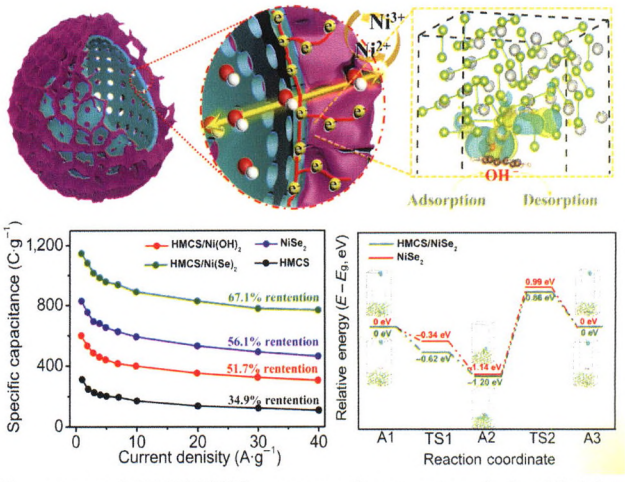
We report a preparation process of the photocatalytic membrane device that can degrade dye pollution under visible light. This filtration membrane with a well-organized multilayer structure simultaneously achieved continuous and flow-through separation of degradation products.

2568–2573

Favorable anion adsorption/desorption of high rate $NiSe_2$ nanosheets/hollow mesoporous carbon for battery-supercapacitor hybrid devices

Xiaojuan Zhao[1], Houzhao Wan[1,*], Pei Liang[2,*], Nengze Wang[1], Cong Wang[1], Yi Gan[1], Xu Chen[1,3], Qiuyang Tan[1], Xiang Liu[1], Jun Zhang[1], Yi Wang[3], Hanbin Wang[1,*], and Hao Wang[1,*]

[1] Hubei University, China
[2] China Jiliang University, China
[3] Max Planck Institute for Solid State Research, Germany

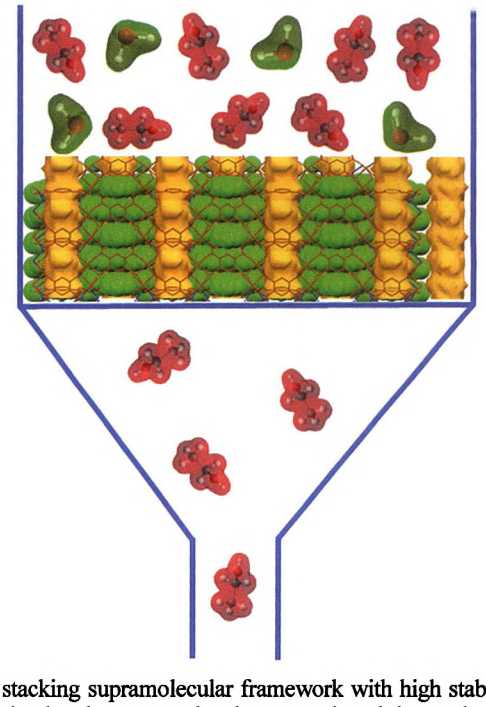


The prepared HMCS/$NiSe_2$ composite structure is benificial to OH^- adsorption/desorption. It shows a max specific capacity of 1,153.5 $C \cdot g^{-1}$ at the current density of 1 $A \cdot g^{-1}$, and can remain at 774.5 $C \cdot g^{-1}$ even at 40 $A \cdot g^{-1}$ (the retention rate as high as 67.1%) and it can keep 80.5% specific capacity after 5,000 cycles at a current density of 10 $A \cdot g^{-1}$.

An ultra-stable microporous supramolecular framework with highly selective adsorption and separation of water over ethanol

Zhengyi Di[1,2], Jiandong Pang[1], Falu Hu[1,*], Mingyan Wu[1,*], and Maochun Hong[1]

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

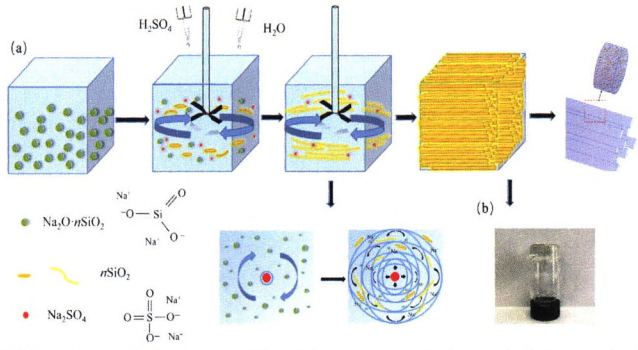


A π···π stacking supramolecular framework with high stability can selectively absorb water molecules over ethanol due to the suitable channels.

A high-strength self-healing nano-silica hydrogel with anisotropic differential conductivity

Xingyu Huang[1], Xiaofan Zhou[1,*], Hao Zhou[1], Yidan Zhong[1], Hui Luo[1], and Fan Zhang[2]

[1] Nanjing Forestry University, China
[2] Fuzhou University, China



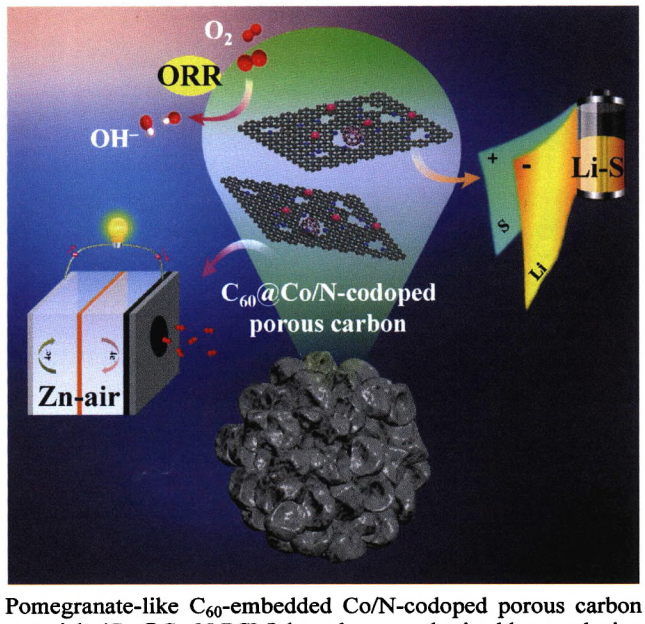
This approach by controling the concentration of the reaction interface and with assistance of mechanical force, prevents the deposition of particles and makes the hydrogel form a special directional hole structure formed.

2589–2595

Pomegranate-like C_{60}@cobalt/nitrogen-codoped porous carbon for high-performance oxygen reduction reaction and lithium-sulfur battery

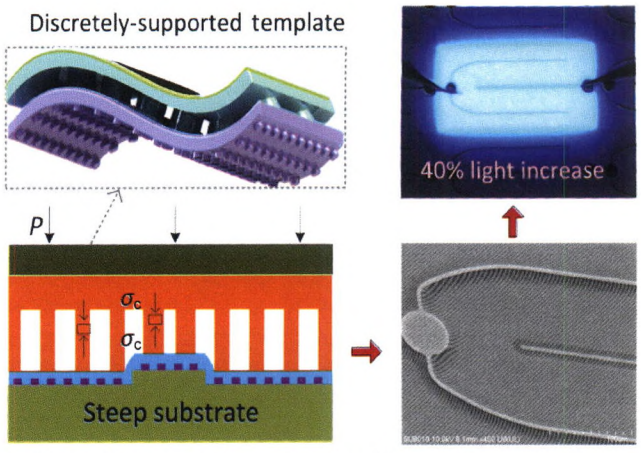
Jianhua Wu, Shiyang Wang, Zhanwu Lei, Runnan Guan, Muqing Chen, Pingwu Du, Yalin Lu, Ruiguo Cao*, and Shangfeng Yang*

University of Science and Technology of China, China

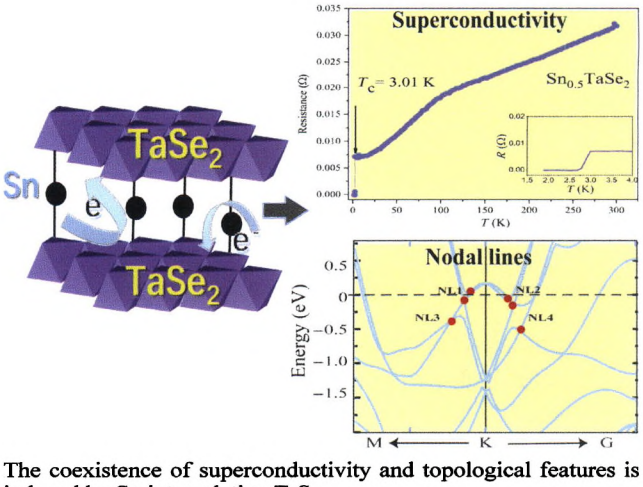


Pomegranate-like C_{60}-embedded Co/N-codoped porous carbon materials (C_{60}@Co-N-PCM) have been synthesized by pyrolyzing a novel C_{60}@ZIF-67 hybrid precursor, affording larger specific surface area, higher electrical conductivity and more exposed Co-N_x active sites of electrocatalysis than the pristine Co-N-PCM, consequently improved ORR electrocatalytic activity and high rate capacity in Li-S battery are achieved.

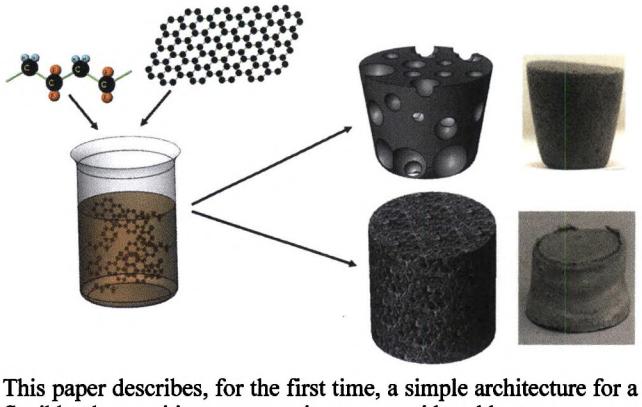
2596–2605



A discretely-supported nanoimprint lithography technique was proposed to nanopatterning on the high-spatial-frequency stepped surface. Based on the proposed discretely-supported nanoimprint lithography (NIL), nanostructures were fabricated on the light emitting diode (LED) chips, with an increase by more than 40% in the optical output power.



The coexistence of superconductivity and topological features is induced by Sn intercalating $TaSe_2$.

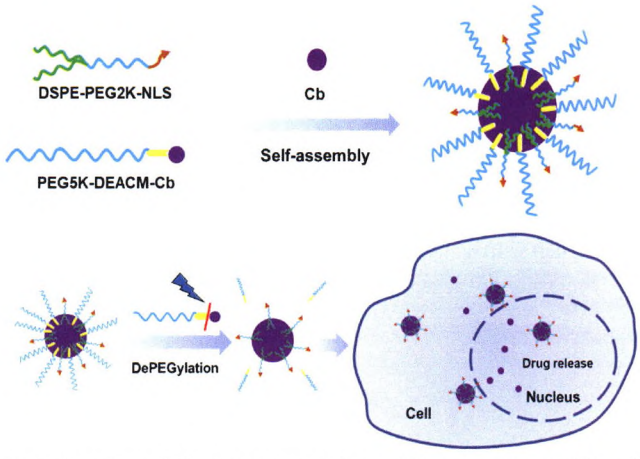


This paper describes, for the first time, a simple architecture for a flexible ultrasensitive, compressive sensor with stable stress–current response and it can be used to detect body motions. Here we explore the use of a unique gelation and crystallization method of poly (vinylidene fluoride) (PVDF) with various loadings of graphene in a simple and sustainable method to fabricate porous microstructure without limit in size and shape.

Photo-triggered nucleus targeting for cancer drug delivery

Yafei Li[1], Wen Lv[1], Lang Wang[1], Yaming Zhang[1], Lipeng Yang[2], Tianyi Wang[1], Linyong Zhu[2], Yufeng Wang[1], and Weiping Wang[1,*]

[1] The University of Hong Kong, Hong Kong, China
[2] East China University of Science and Technology, China

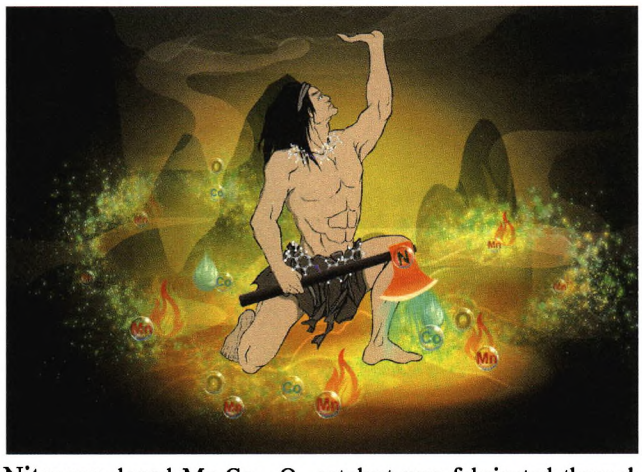


A prodrug-based photo-triggered drug delivery system achieved high drug loading capacity and nucleus targeting for cancer therapy, with extended targeting ability by simply changing targeting ligands.

Jahn-Teller distortion assisted interstitial nitrogen engineering: Enhanced oxygen dehydrogenation activity of N-doped $Mn_xCo_{3-x}O_4$ hierarchical micro-nano particles

Yangxin Jin[1,2], Fengfeng Li[1], Peixin Cui[3], Yun Yang[2], Qingping Ke[1,*], Minh Ngoc Ha[1,4], Wangcheng Zhan[5], Fei Ruan[1], Chao Wan[1], Zhao Lei[1], Van Noi Nguyen[4], Wei Chen[2,*], and Jun Tang[1,*]

[1] Anhui University of Technology, China
[2] Wenzhou University, China
[3] Institute of Soil Science, Chinese Academy of Sciences, China
[4] Vietnam National University, Vietnam
[5] East China University of Science and Technology, China

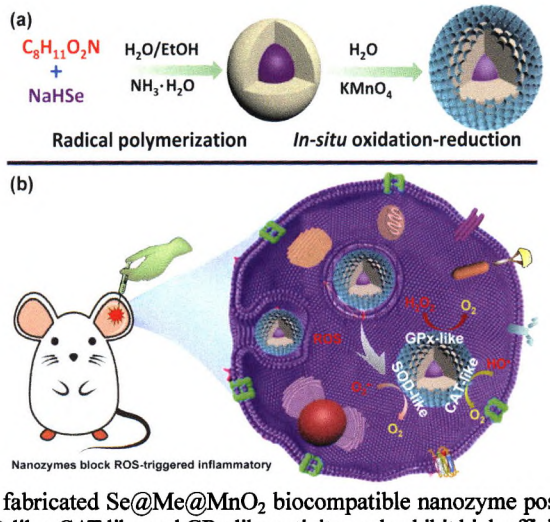


Nitrogen-doped $Mn_xCo_{3-x}O_4$ catalyst was fabricated through interstitial N heteroatom-engineered oxygen vacancies for efficient aerobic dehydrogenation coupling of aromatic amine to azobenzene.

Multi-shell nanocomposites based multienzyme mimetics for efficient intracellular antioxidation

Yongjian Ai[1], Jinzhi You[1], Jianyi Gao[2], Jiaping Wang[2], Hong-bin Sun[3], Mingyu Ding[1], and Qionglin Liang[1,*]

[1] Tsinghua University, China
[2] China Astronaut Research and Training Center, China
[3] Northeastern University, China

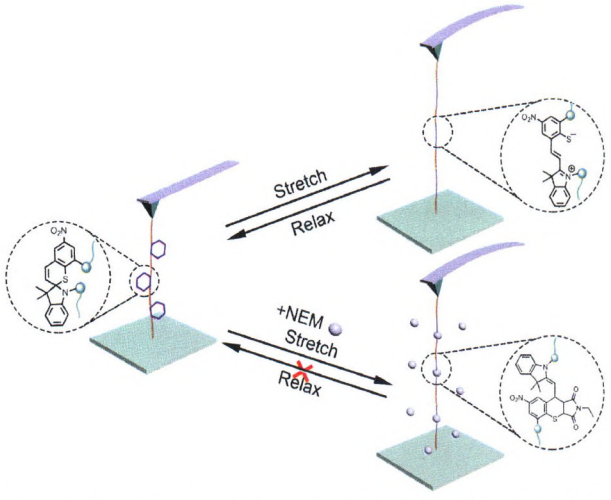


The fabricated $Se@Me@MnO_2$ biocompatible nanozyme possess SOD-like, CAT-like and GPx-like activity, and exhibit high efficiency for intracellular antioxidation and anti-inflammation.

Single-molecule observation of mechanical isomerization of spirothiopyran and subsequent Click addition

Ruixiang Yao[1], Xun Li[1,3], Nan Xiao[2], Wengui Weng[2,*], and Wenke Zhang[1,*]

[1] Jilin University, China
[2] Xiamen University, China
[3] University of Liège, Belgium

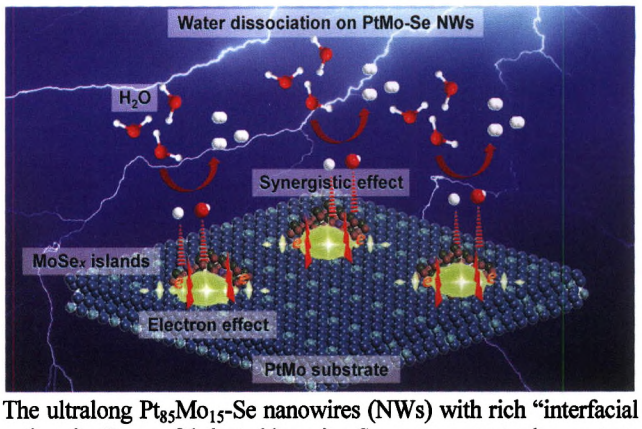


Dynamic ring opening-closing process of spirothiopyran and the Click reaction after isomerization were monitored at single molecule level by using atomic force microscopy (AFM)-based single molecule force spectroscopy.

Suppressing the surface passivation of Pt-Mo nanowires via constructing Mo-Se coordination for boosting HER performance

Lei Yu[1], Tingting Zhou[1], Shuhua Cao[1], Xishi Tai[1], Lili Liu[1], and Yao Wang[2,*]

[1] Weifang University, China
[2] Tsinghua University, China

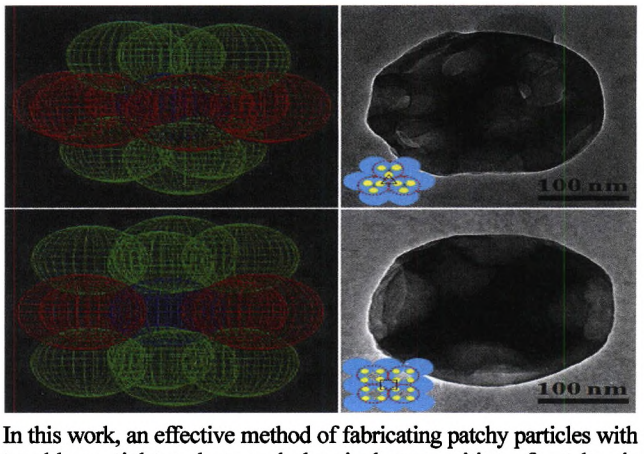


The ultralong $Pt_{85}Mo_{15}$-Se nanowires (NWs) with rich "interfacial active sites" were fabricated by using Se as promoter to demonstrate the enhanced catalytic hydrogen evolution reaction (HER) performance triggered by the electronic and synergistic effect of PtMo/$MoSe_x$.

Gram-scale fabrication of patchy nanoparticles with tunable spatial topology and chemical functionality

Jiecheng Cui[1,2,*], Yi Li[1], Huili Yuan[1], Ning Gao[2], Kai Feng[2], Wenyun Li[2], Kang Zhou[2], Xianpeng Yin[2], and Guangtao Li[2,*]

[1] Zhejiang Normal University, China
[2] Tsinghua University, China

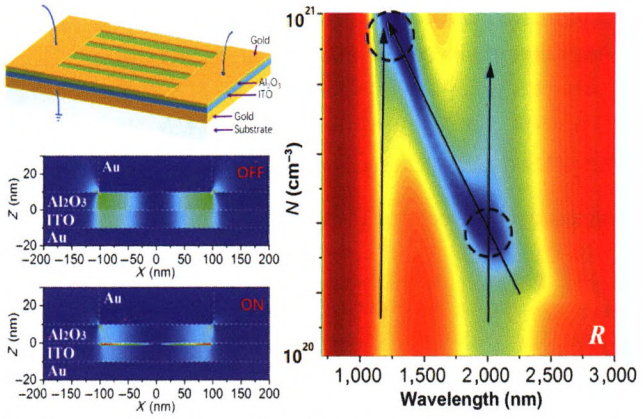


In this work, an effective method of fabricating patchy particles with tunable spatial topology and chemical composition of patches is presented. The number, distribution, size and chemical property of the patches can be tailored by adjusting the packing of the colloidal particles and the processing condition.

Ultra-broadband spatial light modulation with dual-resonance coupled epsilon-near-zero materials

Qin Chen[1,*], Shichao Song[2], Huacun Wang[2], Li Liang[1], Yajin Dong[1], and Long Wen[1,*]

[1] Jinan University, China
[2] Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China

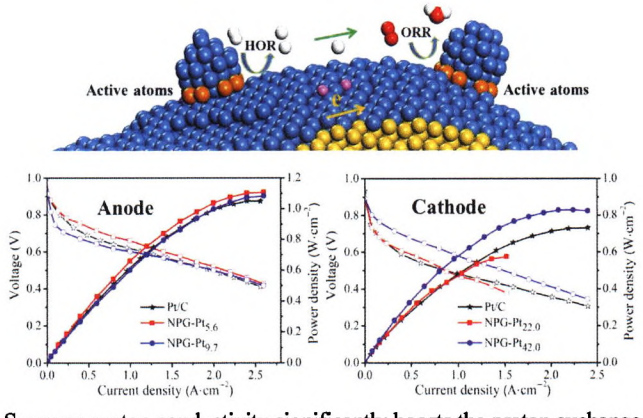


Dual-resonance enhanced epsilon-near-zero electroabsorption modulation scheme enables a significant improvement of modulation depth-bandwidth product in an indium tin oxide (ITO) embedded metal-dielectric-metal structure.

Ultrathin nanoporous metal electrodes facilitate high proton conduction for low-Pt PEMFCs

Shuai Shi, Xianglong Wen, Qinqin Sang, Shuai Yin, Kaili Wang, Jian Zhang, Min Hu, Huiming Yin, Jia He*, and Yi Ding*

Tianjin University of Technology, China

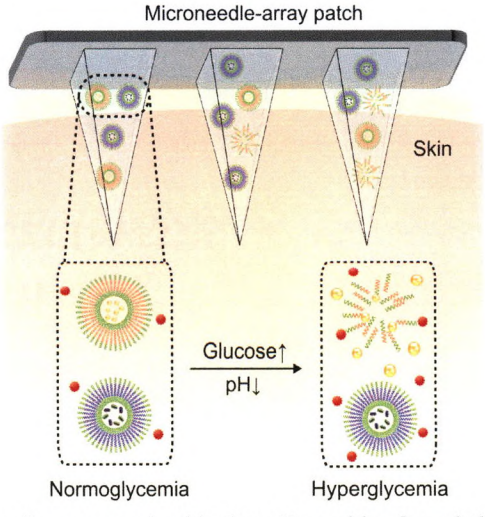


Supreme proton conductivity significantly boosts the proton exchange membrane fuel cell (PEMFC) performance of ultrathin nanoporous metal electrodes without ionomers.

Microneedle-array patch with pH-sensitive formulation for glucose-responsive insulin delivery

Feng-Qin Luo[1], Guojun Chen[2], Wei Xu[3], Daojia Zhou[2], Jia-Xian Li[1], Yong-Cong Huang[1], Run Lin[3,*], Zhen Gu[2,5,*], and Jin-Zhi Du[1,2,4,*]

[1] South China University of Technology, China
[2] University of California, Los Angeles, USA
[3] The First Affiliated Hospital of Sun Yat-Sen University, China
[4] Bioland Laboratory (Guangzhou Regenerative Medicine and Health Guangdong Laboratory), China
[5] Zhejiang University, China

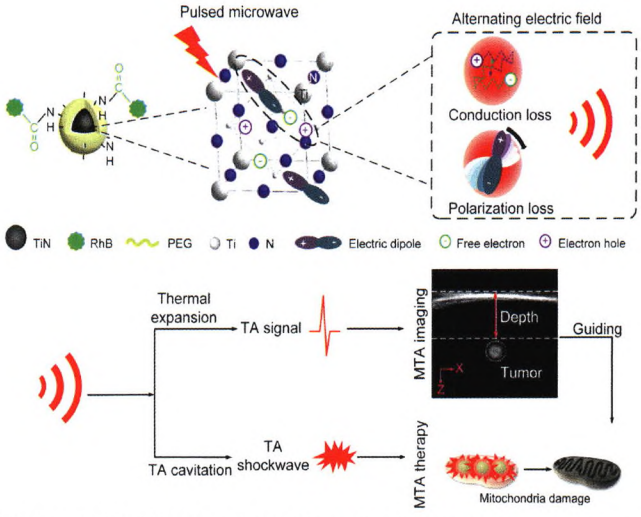


Microneedle-array patch with ultra pH-sensitive formulations was designed for self-regulated insulin delivery.

Defect-rich titanium nitride nanoparticle with high microwave-acoustic conversion efficiency for thermoacoustic imaging-guided deep tumor therapy

Zhujun Wu, Fanchu Zeng, Le Zhang, Shuxiang Zhao, Linghua Wu, Huan Qin*, and Da Xing*

South China Normal University, China

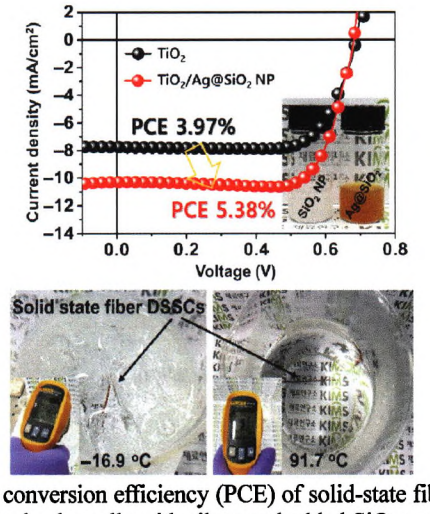


Defect-rich TiN NPs efficiently convert the microwave energy into shockwave via thermocavitation effect, achieving localized mechanical damage of mitochondria in the tumor cell and yielding a precise antitumor effect.

Highly efficient and stable solid-state fiber dye-sensitized solar cells with Ag-decorated SiO_2 nanoparticles

Jae Ho Kim[1], Seok-Ju Yoo[1], Daseul Lee[1], Jin Woo Choi[1], Sang-Cheol Han[2], Tae In Ryu[3], Hyung Woo Lee[4,*], Myunghun Shin[5,*], and Myungkwan Song[1,*]

[1] Korea Institute of Materials Science (KIMS), Republic of Korea
[2] CEN Nano. Co. Ltd., Republic of Korea
[3] National Institute of Chemical Safety (NICS), Republic of Korea
[4] Pusan National University, Republic of Korea
[5] Korea Aerospace University, Republic of Korea

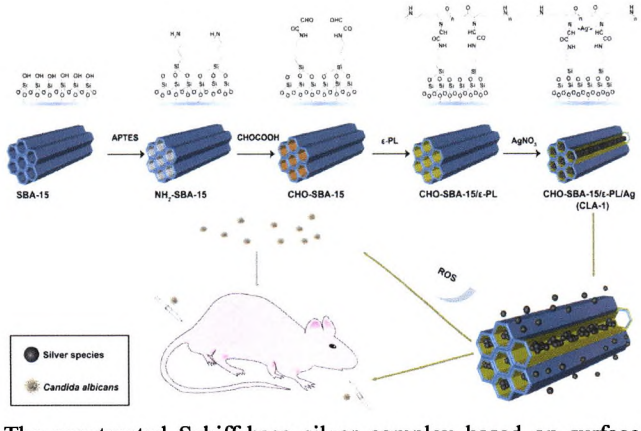


The power conversion efficiency (PCE) of solid-state fiber-shaped dye-sensitized solar cells with silver-embedded SiO_2 nanoparticles reaches 5.38%, which is comparable to the reference (3.98%). And the PCEs remain at 95% between −16.9 to 91.7 °C, indicating the operational stability of solid-state fiber-shaped dye-sensitized solar cells (SS-FDSSCs) within this temperature range.

Schiff-base silver nanocomplexes formation on natural biopolymer coated mesoporous silica contributed to the improved curative effect on infectious microbes

Ling Cai[1], Yanqiang Huang[1,2], Yuanyuan Duan[1], Qiao Liu[1], Qilan Xu[1], Jia Jia[1], Jianming Wang[1], Qian Tong[1], Peipei Luo[1], Yujie Wen[3], Luming Peng[3], Qian Wu[1], Xudong Hang[1], Huijun Jiang[1], Ping Zhu[1], Yanmei Yang[1], Boshen Zhou[1], Liping Zeng[1], Hongkai Bi[1,*], and Jin Chen[1,*]

[1] Nanjing Medical University, China
[2] Youjiang Medical University for Nationalities, China
[3] Nanjing University, China

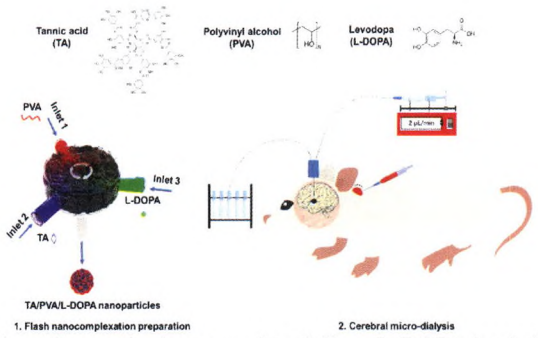


The constructed Schiff-base silver complex based on surface aldehyde-modified mesoporous silica possessed potent and long-lasting antimicrobial activities both *in vitro* and *in vivo*.

Non-invasive delivery of levodopa-loaded nanoparticles to the brain via lymphatic vasculature to enhance treatment of Parkinson's disease

Tianqi Nie[1], Zhiyu He[2,*], Jinchang Zhu[3], Kuntao Chen[3], Gregory P. Howard[3,4], Jesus Pacheco-Torres[4], Il Minn[3,4], Pengfei Zhao[1], Zaver M. Bhujwalla[4], Hai-Quan Mao[3,4,*], Lixin Liu[1], and Yongming Chen[1,*]

[1] Sun Yat-sen University, China
[2] Ocean University of China, China
[3] Johns Hopkins University, USA
[4] Johns Hopkins School of Medicine, USA

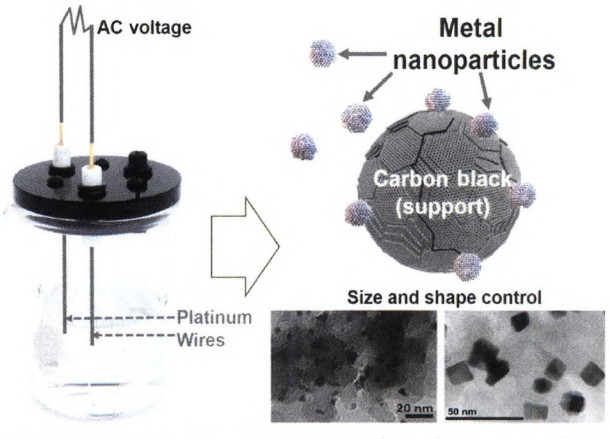


Non-invasive method was used to deliver L-DOPA-loaded sub-50 nm nanoparticles to the brain via brain–lymphatic vasculature to bypass the blood–brain barrier. This hydrogen bond-based delivery system between L-DOPA and TA/PVA was prepared via flash nanocomplexation (FNC) method in a one-step, aqueous phase, continuous, and scalable manner. Pharmacodynamics analysis on reserpine-induced Parkinson's disease (PD) rat model demonstrated the levels of dopamine and tyrosine hydroxylase, which indicate the dopaminergic neuron functions, were increased by 2- and 4-fold respectively, compared to the model groups. Movement disorders and cerebral oxidative stress of the rats were significantly improved without acute toxicity to the major organs, indicating this effective delivery of biocompatible uniform TA/PVA/L-DOPA nanoparticles via brain–lymphatic vasculature holds high clinical translation potential for the treatment of the PD.

Electrochemical top-down synthesis of C-supported Pt nano-particles with controllable shape and size: Mechanistic insights and application

Batyr Garlyyev[1,*], Sebastian Watzele[1], Johannes Fichtner[1], Jan Michali ka[2], Alexander Schökel[3], Anatoliy Senyshyn[1], Andrea Perego[4], Dingjie Pan[4], Hany A. El-Sayed[1], Jan M. Macak[2], Plamen Atanassov[4], Iryna V. Zenyuk[4,*], and Aliaksandr S. Bandarenka[1,*]

[1] Technical University of Munich, Germany
[2] Brno University of Technology, Czech Republic
[3] Deutsches Elektronen Synchrotron (DESY), Germany
[4] University of California, Irvine, USA

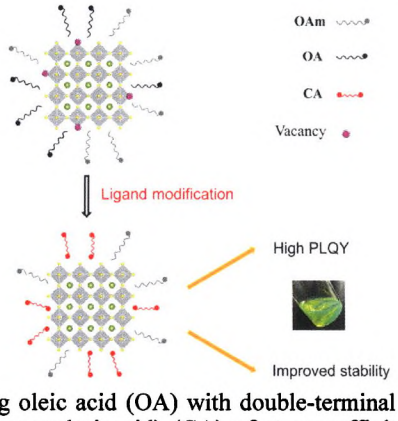


Herein, we demonstrate an electrochemical top-down approach for synthesis of metal nanoparticles. The size and shape of the formed nanoparticles can be governed by tailoring applied potential and solution components.

Room temperature preparation of highly stable cesium lead halide perovskite nanocrystals by ligand modification for white light-emitting diodes

Yu Zhang, Guishun Li, Changkun She, Shaohua Liu, Fangyu Yue, Chengbin Jing*, Ya Cheng, and Junhao Chu

East China Normal University, China

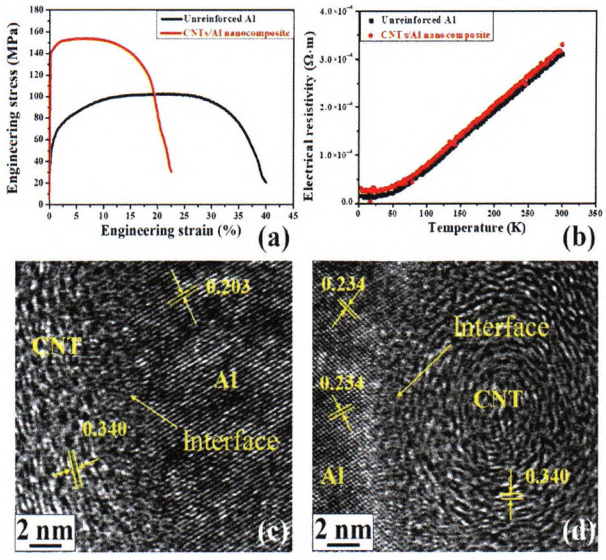


By replacing oleic acid (OA) with double-terminal ligand 4,4'-Azobis(4-cyanovalericacid) (CA) of strong affinity, the room temperature synthesis $CsPbBr_3$ nanocrystals present transparent green solution, indicating high photoluminescence quantum yield (PLQY) and enhanced stability.

A novel aluminum-carbon nanotubes nanocomposite with doubled strength and preserved electrical conductivity

Shuai Zhang[1], Gaoqiang Chen[1], Timing Qu[1], Jinquan Wei[1], Yufan Yan[1], Qu Liu[1], Mengran Zhou[1], Gong Zhang[1], Zhaoxia Zhou[2], Huan Gao[3], Dawei Yao[3], Yuanwang Zhang[3], Qingyu Shi[1,*], and Hua Zhang[4]

[1] Tsinghua University, China
[2] Loughborough University, UK
[3] Shanghai Electric Cable Research Institute Co., Ltd., China
[4] Beijing Institute of Petrochemical Technology, China

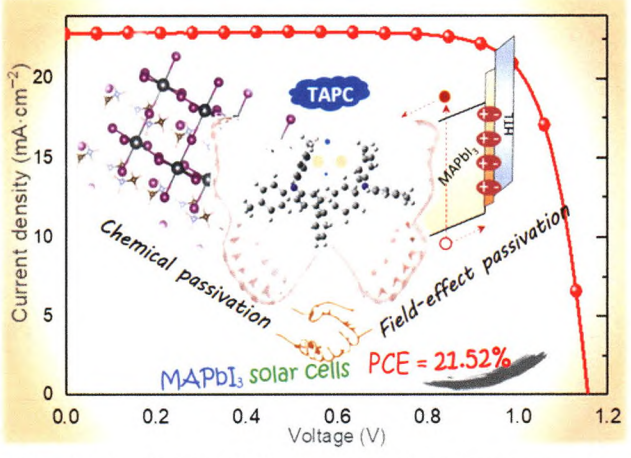


The traditional trade-off between mechanical strength and electrical conductivity of pure Al is overcome by ensuring clean and tightly bonded CNTs/Al interface during the nanocomposite preparation via friction stir processing.

Full-scale chemical and field-effect passivation: 21.52% efficiency of stable $MAPbI_3$ solar cells via benzenamine modification

Fengyou Wang[1], Meifang Yang[1], Yuhong Zhang[1], Jinyue Du[1], Shuo Yang[2], Lili Yang[1,*], Lin Fan[1], Yingrui Sui[1], Yunfei Sun[1], and Jinghai Yang[1,*]

[1] Jilin Normal University, China
[2] Changchun University, China



Full-scale chemical and field-effect passivation have been realized by benzenamine modification for perovskite solar cells to boost its photovoltaic performance and long-term stability.

Simultaneous diffusion of cation and anion to access N, S co-coordinated Bi-sites for enhanced CO_2 electroreduction

Zhiyuan Wang[1], Chun Wang[2], Yidong Hu[1], Shuai Yang[4], Jia Yang[1,6], Wenxing Chen[5], Huang Zhou[1], Fangyao Zhou[1], Lingxiao Wang[1], Junyi Du[1], Yafei Li[2,*], and Yuen Wu[1,3,*]

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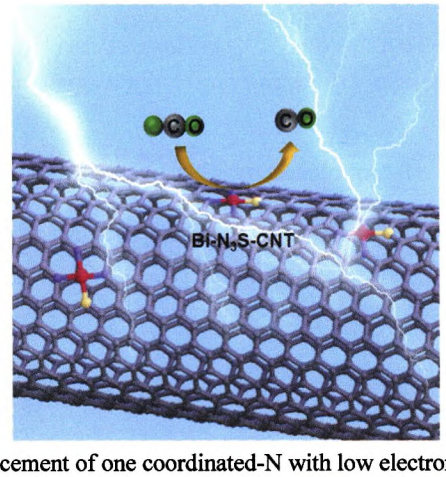
[2] Nanjing Normal University, China
[3] Dalian National Laboratory for Clean Energy, China
[4] Shanghai Institute of Applied Physics, Chinese Academy of Sciences, China
[5] Beijing Institute of Technology, China
[6] Anhui University, China

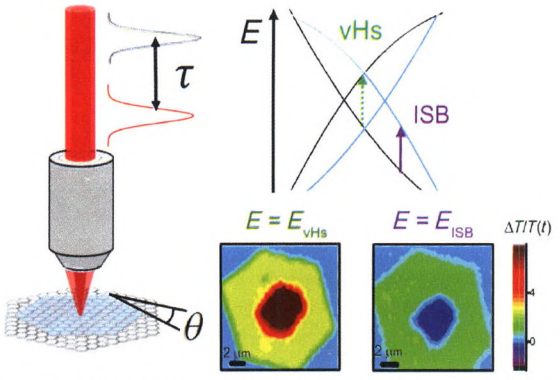


The replacement of one coordinated-N with low electronegative S in Bi-N_4C center can greatly promote the catalytic activity and Faradaic efficiency of electrochemical CO_2 reduction to CO.

Angle-tunable intersubband photoabsorption and enhanced photobleaching in twisted bilayer graphene

Eva A. A. Pogna[1], Xianchong Miao[2], Driele von Dreifus[3], Thonimar V. Alencar[4], Marcus V. O. Moutinho[5], Pedro Venezuela[6], Cristian Manzoni[7], Minbiao Ji[2,*], Giulio Cerullo[7,*], and Ana Maria de Paula[3,*]

[1] Laboratory NEST, Italy
[2] Fudan University, China
[3] Universidade Federal de Minas Gerais, Brazil
[4] Universidade Federal de Ouro Preto, Brazil
[5] Universidade Federal do Rio de Janeiro, Brazil
[6] Universidade Federal Fluminense, Brazil
[7] Politecnico di Milano, Italy

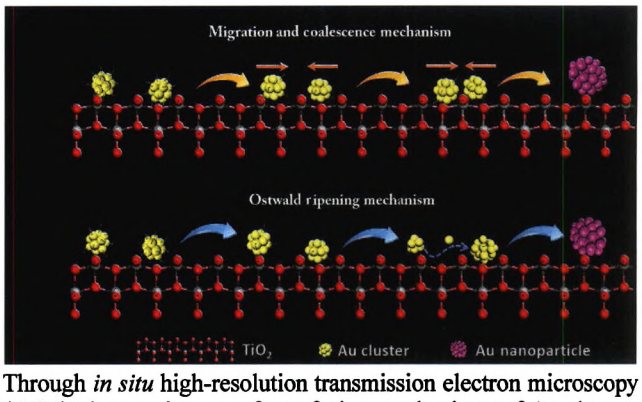


High-sensitivity femtosecond microscopy with broad spectral coverage reveals photoinduced intersubband absorption and enhanced photobleaching bands in twisted bilayer graphene endowed with tens of picosecond long relaxation time and twist angle-tunable peak energies.

Visualizing light-induced dynamic structural transformations of Au clusters-based photocatalyst via *in situ* TEM

Bo Weng[1,2], Youhong Jiang[1], Hong-Gang Liao[1,*], Maarten B. J. Roeffaers[2], Feili Lai[2], Haowei Huang[2,*], and Zichao Tang[1,*]

[1] Xiamen University, China
[2] KU Leuven, Belgium

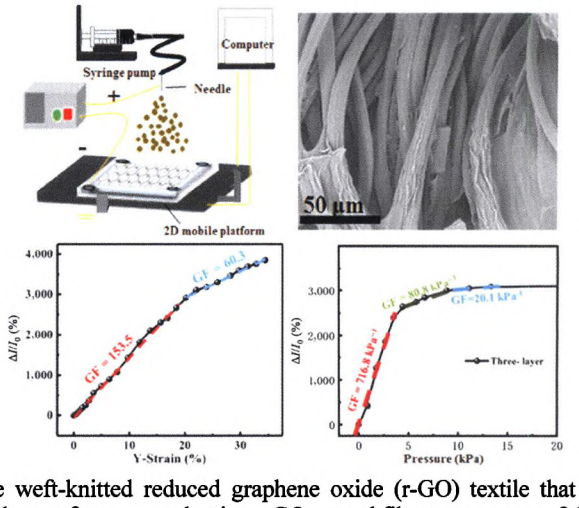


Through *in situ* high-resolution transmission electron microscopy (TEM), the coexistence of two fusion mechanisms of Au clusters on TiO_2 under ultraviolet–visible (UV–Vis) light irradiation in air is identified, i.e., the migration and coalescence (MC) and Ostwald ripening (OR). Additionally, the Au clusters have higher stability in an inert N_2 atmosphere or vacuum than the oxidizing atmospheres (i.e., air and O_2).

Reliable sensors based on graphene textile with negative resistance variation in three dimensions

Wenpeng Han[1,*], Yijun Wu[1], He Gong[1], Linxin Liu[1], Junxiang Yan[1,3], Mengfei Li[1], Yunze Long[1,*], and Guozhen Shen[2,*]

[1] Qingdao University, China
[2] Institute of Semiconductors, Chinese Academy of Sciences, China
[3] Institute of Physics, Chinese Academy of Sciences, China

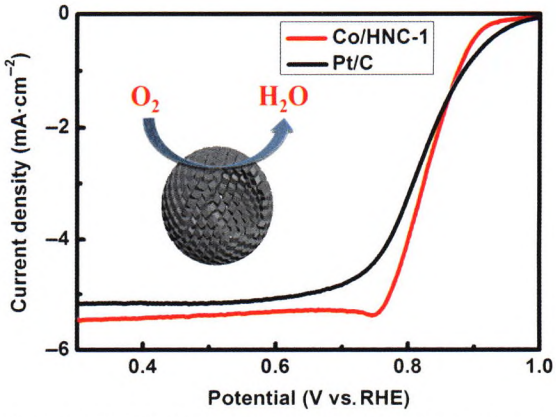


The weft-knitted reduced graphene oxide (r-GO) textile that is made up of many conductive r-GO coated fibers was successfully prepared dependent on the electrospray deposition technique. Based on the negative resistance variation characteristic in three dimensions, the r-GO textile transverse-strain and pressure sensors all show the excellent sensing characteristics.

Self-templated formation of cobalt-embedded hollow N-doped carbon spheres for efficient oxygen reduction

Ayaz Mahsud[1], Jianian Chen[1], Xiaolei Yuan[2], Fenglei Lyu[1,*], Qixuan Zhong[1], Jinxing Chen[1,3], Yadong Yin[3], and Qiao Zhang[1,*]

[1] Soochow University, China
[2] Nantong University, China
[3] University of California, Riverside, USA

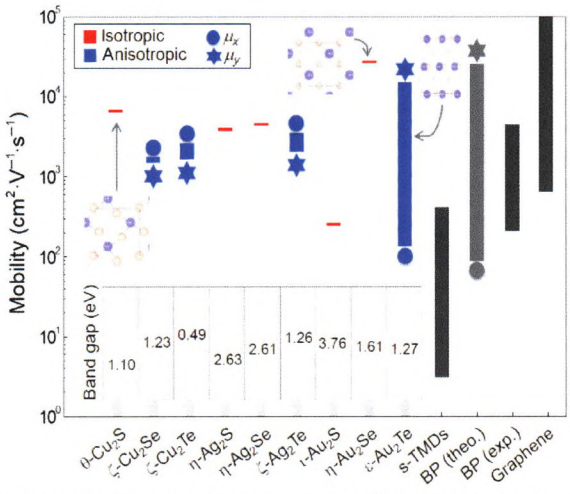


Cobalt-embedded hollow nitrogen-doped carbon spheres with enhanced oxygen reduction reaction (ORR) activity and stability are fabricated via a metal-organic-framework-engaged self-templated strategy. The enhanced ORR performance can be attributed to the hollow structure which provided enlarged electrochemically active surface area, more active Co-N species and defects.

Semiconducting M_2X (M = Cu, Ag, Au; X = S, Se, Te) monolayers: A broad range of band gaps and high carrier mobilities

Lei Gao[1,2], Yan-Fang Zhang[1], and Shixuan Du[1,3,*]

[1] Institute of Physics & University of Chinese Academy of Sciences, Chinese Academy of Sciences, China
[2] Kunming University of Science and Technology, China
[3] CAS Key Laboratory of Vacuum Physics, China

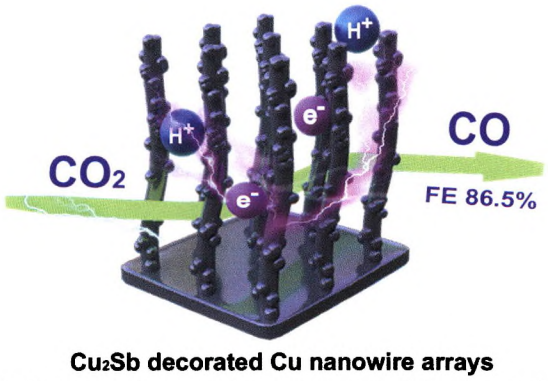


Two-dimensional group-11-chalcogenides (M_2X, M = Cu, Ag, Au; X = S, Se, Te) adopt variable configurations due to their natural non-layer bulk phases. A group of M_2X monolayers were proposed, possessing a broad range of band gaps ranging from 0.49 to 3.76 eV and high room-temperature carrier mobilities.

Cu_2Sb decorated Cu nanowire arrays for selective electrocatalytic CO_2 to CO conversion

Shiyong Mou[1], Yonghao Li[2], Luchao Yue[3], Jie Liang[3], Yonglan Luo[2], Qian Liu[3], Tingshuai Li[3], Siyu Lu[4], Abdullah M. Asiri[5], Xiaoli Xiong[1,*], Dongwei Ma[6,*], and Xuping Sun[3,*]

[1] Sichuan Normal University, China
[2] China West Normal University, China
[3] University of Electronic Science and Technology of China, China
[4] Zhengzhou University, China
[5] King Abdulaziz University, Saudi Arabia
[6] Henan University, China



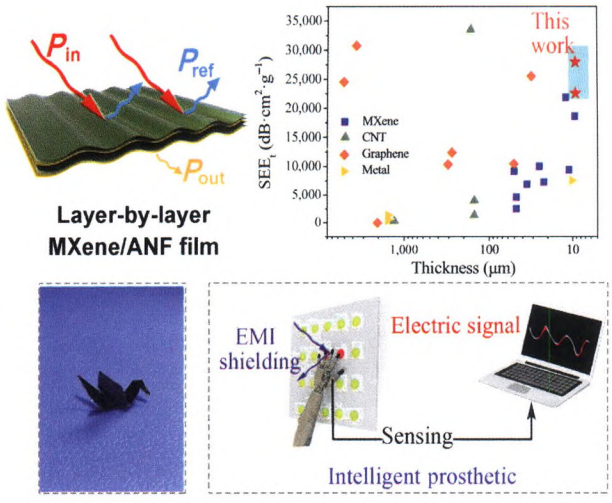
Cu_2Sb decorated Cu nanowire arrays

Cu_2Sb decorated Cu nanowire arrays on Cu foil were employed as a high-performance catalyst for electrochemical CO_2 to CO conversion. In CO_2-saturated 0.1 M $KHCO_3$ solution, it achieves a high Faraday efficiency (FE) of 86.5% for CO, at −0.90 V vs. reversible hydrogen electrode (RHE), and the H_2/CO ratio is tunable from 0.08:1 to 5.9:1 by adjusting the potential.

Ultrathin MXene-aramid nanofiber electromagnetic interference shielding films with tactile sensing ability withstanding harsh temperatures

Dawei Hu[1], Siqi Wang[1], Cheng Zhang[2], Pengshu Yi[3], Pingkai Jiang[1], and Xingyi Huang[1,*]

[1] Shanghai Jiao Tong University, China
[2] Wuhan University of Technology, China
[3] Nanjing University of Aeronautics and Astronautics, China

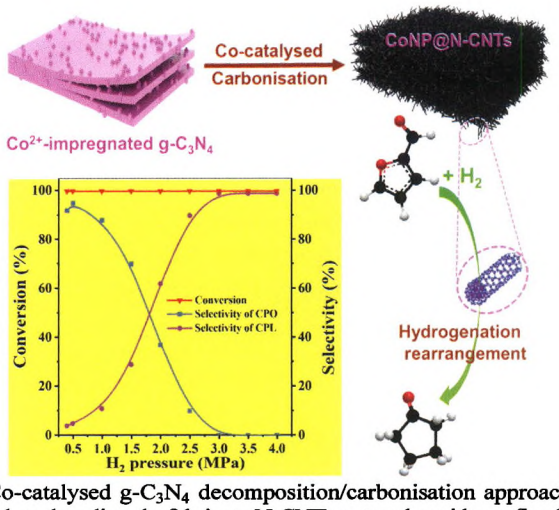


An ultrathin and flexible $Ti_3C_2T_x$ MXene-aramid nanofiber film was fabricated, which displayed strong electromagnetic interference (EMI) shielding ability even after heating/cooling treatments within a wide temperature range of −196 – 300 °C. Also, the film is capable of detecting tactile signals via the triboelectric effect.

Converting Co^{2+}-impregnated g-C_3N_4 into N-doped CNTs-confined Co nanoparticles for efficient hydrogenation rearrangement reactions of furanic aldehydes

Dongdong Wang[1,2], Mohammad Al-Mamun[3], Wanbing Gong[1,*], Yang Lv[1,2], Chun Chen[1], Yue Lin[2], Guozhong Wang[1], Haimin Zhang[1], and Huijun Zhao[1,3,*]

[1] Institute of Solid State Physics, Chinese Academy of Sciences, China
[2] University of Science and Technology of China, China
[3] Griffith University, Australia

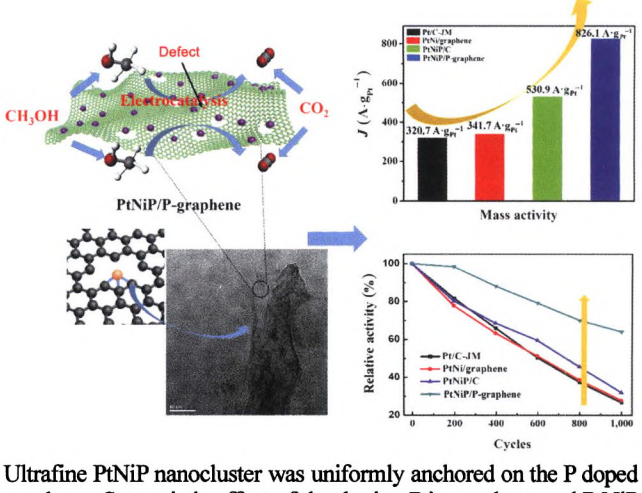


A Co-catalysed g-C_3N_4 decomposition/carbonisation approach is developed to directly fabricate N-CNTs networks with confined Co NPs from the pristine g-C_3N_4 with impregnated Co^{2+} as efficient hydrogenation rearrangement catalyst to convert furanic aldehydes to the corresponding cyclopentanones.

Nanocluster PtNiP supported on graphene as an efficient electrocatalyst for methanol oxidation reaction

Long Yang[1,2], Guoqiang Li[2], Rongpeng Ma[2], Shuai Hou[2], Jinfa Chang[2], Mingbo Ruan[2], Wenbin Cai[3], Zhao Jin[2,*], Weilin Xu[2], Guiling Wang[1,*], Junjie Ge[2], Changpeng Liu[2], and Wei Xing[2,*]

[1] Harbin Engineering University, China
[2] Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China
[3] Fudan University, China



Ultrafine PtNiP nanocluster was uniformly anchored on the P doped graphene. Synergistic effect of the doping P in graphene and PtNiP alloying boosts methanol oxidation reaction (MOR) performance of PtNiP/P-graphene.

The achievement of red upconversion lasing for highly stable perovskite nanocrystal glasses with the assistance of anion modulation

Mengfeifei Jin[1], Wei Gao[3], Xiaojuan Liang[1], Ying Fang[1], Siufung Yu[3,4], Ting Wang[2,3,*], and Weidong Xiang[1,*]

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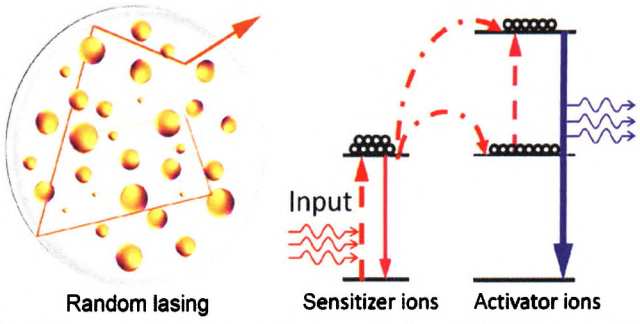
[2] Chengdu University of Technology, China
[3] The Hong Kong Polytechnic University, China
[4] The Hong Kong Polytechnic University Shenzhen Research Institute, China



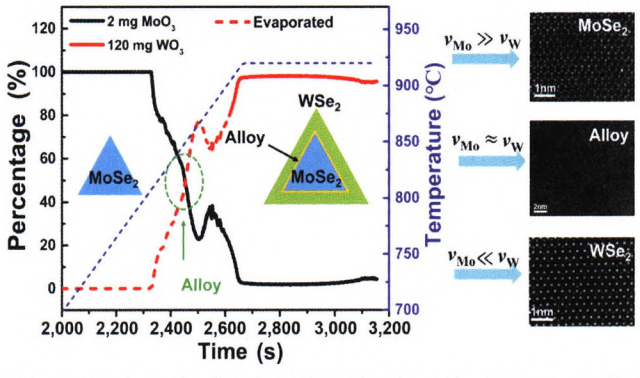
In this work, a series of stable red emitting $CsPbX_3$ (X = Br, I) nanocrystals (NCs) glasses were prepared by embedding the all-inorganic perovskite NCs in the glass matrixes through melting quenching. In particular, the random lasing under two-photon excitation is obtained by utilizing the property that the highly disordered state inside the glass can realize multiple scattering.

2861–2866

Controlled growth of transition metal dichalcogenide via thermogravimetric prediction of precursors vapor concentration

Long Fang[1], Shaohua Tao[1], Zhenzhen Tian[1], Kunwu Liu[1], Xi Li[2], Jiang Zhou[1], Han Huang[1], Jun He[1], and Xiaoming Yuan[1,*]

[1] Central South University, China
[2] Changsha University of Science and Technology, China



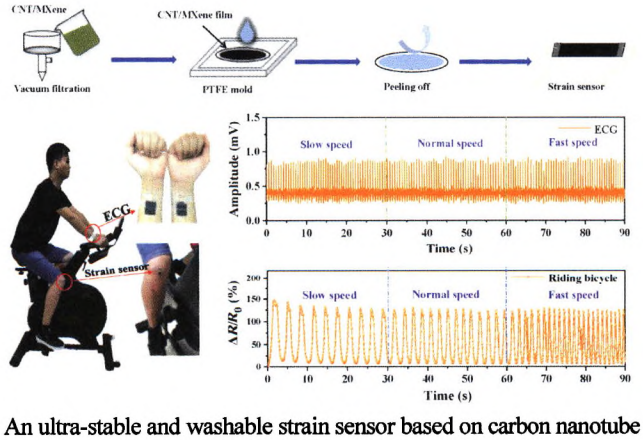
Thermogravimetric (TG/DTG) technology is used to predict precursor concentration to selectively synthesize transition metal dichalcogenides (TMDs).

2867–2874

Wearable CNT/$Ti_3C_2T_x$ MXene/PDMS composite strain sensor with enhanced stability for real-time human healthcare monitoring

Xiaowen Xu[1], Yucheng Chen[1], Pei He[1,*], Song Wang[1], Kai Ling[1], Longhui Liu[1], Pengfei Lei[1], Xianjun Huang[2], Hu Zhao[3], Jianyun Cao[3], and Junliang Yang[1,*]

[1] Central South University, China
[2] National University of Defense Technology, China
[3] University of Manchester, UK



An ultra-stable and washable strain sensor based on carbon nanotube (CNT) and $Ti_3C_2T_x$ MXene exhibits a resistance sensitive to strain, reliable responses to different frequencies, long-term cycling durability over 1,000 cycles, anti-interference of temperature and washability. The strain sensor can simultaneously monitor the electrocardiogram (ECG) signal and joint movement while riding a sports bicycle, enabling the great potential in real-time human healthcare monitoring.

2875–2883

ISSN 1998-0124
CN 11-5974/O4

Nano Research

Volume 14 · Number 8 · August 2021
(Monthly, started in 2008)

纳米研究（英文版）（月刊，2008年创刊） 第14卷 第8期 2021年8月出版

Editors-in-Chief	Yadong Li, Shoushan Fan	**主管单位**	中华人民共和国教育部
Sponsored by	Tsinghua University & Chinese Chemical Society	**主办单位**	清华大学
Edited by	Nano Research Editorial Office		中国化学会
Published by	Tsinghua University Press	**主　编**	李亚栋　范守善
Address	Xueyan Building, Tsinghua University, Beijing 100084, China	**编　辑**	《纳米研究》编辑部
		出版发行	清华大学出版社有限公司
		印刷单位	北京地大彩印有限公司

Website www.theNanoResearch.com & www.springer.com/journal/12274
Online Manuscript Submission, Review and Tracking System www.editorialmanager.com/nare

ISSN 1998-0124

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