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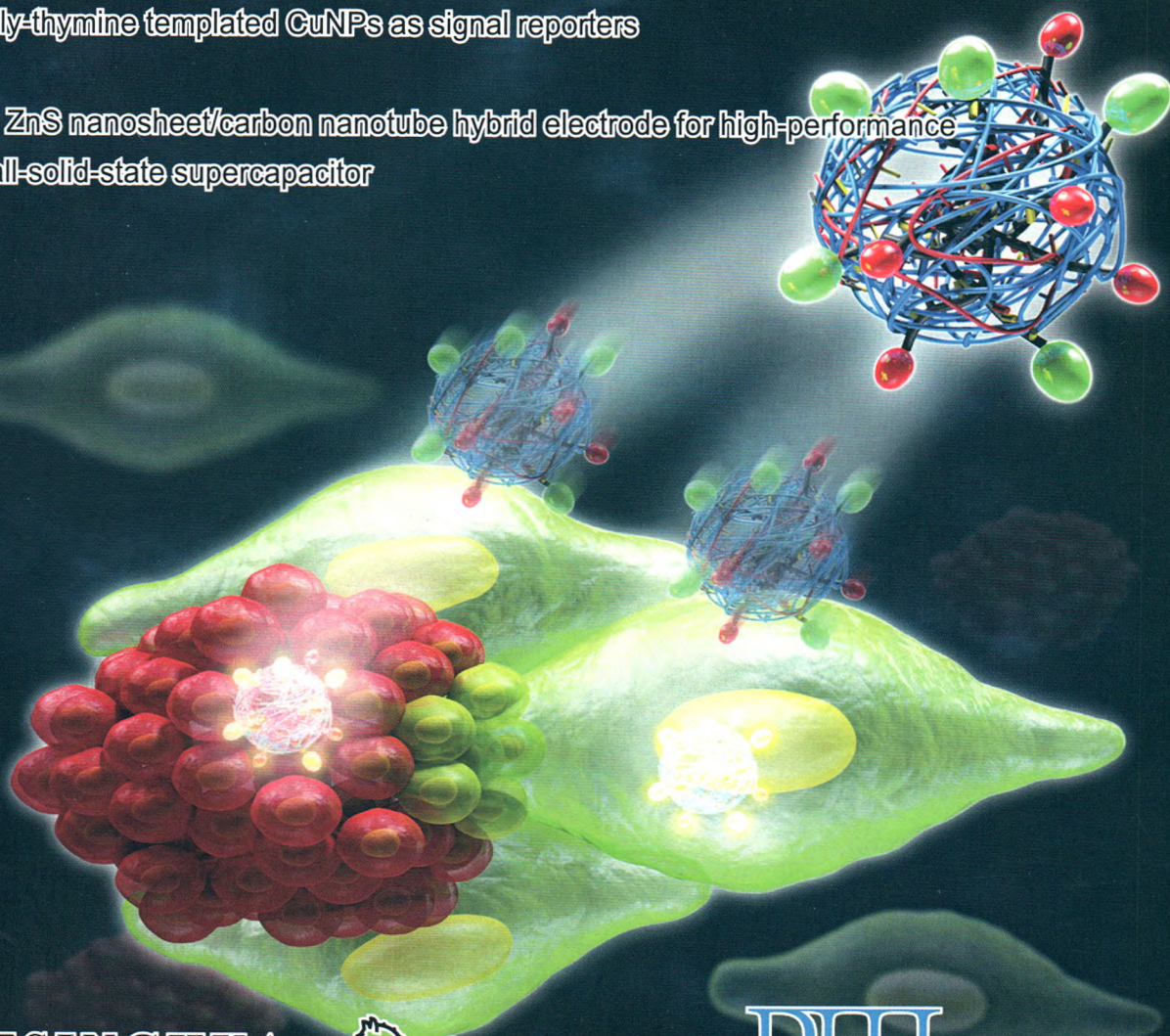


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Fluorescent nanoswitch for monitoring specific pluripotency-related microRNAs of induced pluripotent stem cells: Development of polyethyleneimine-oligonucleotide hybridization probes

Simple, fast, label-free, and nanoquencher-free system for operating multivalued DNA logic gates using poly-thymine templated CuNPs as signal reporters

Ultrathin ZnS nanosheet/carbon nanotube hybrid electrode for high-performance flexible all-solid-state supercapacitor



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Research Articles

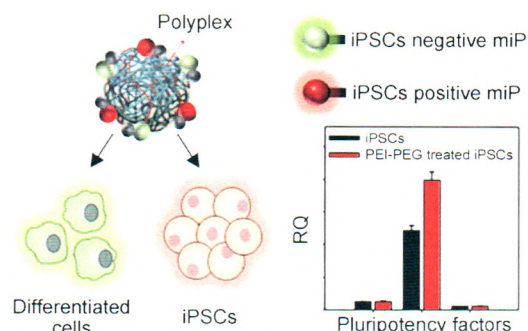
Fluorescent nanoswitch for monitoring specific pluripotency-related microRNAs of induced pluripotent stem cells: Development of polyethyleneimine-oligonucleotide hybridization probes

Seungmin Han¹, Hye Young Son¹, Byunghoon Kang¹, Eunji Jang¹, Jisun Ki¹, Na Geum Lee^{2,3}, Jongjin Park^{2,3}, Moo-Kwang Shin¹, Byeonggeol Mun¹, Jeong-Ki Min^{2,3,*}, and Seungjoo Haam^{1,*}

¹ Yonsei University, Republic of Korea

² Korea Research Institute of Bioscience and Biotechnology, Republic of Korea

³ University of Science & Technology, Republic of Korea



Polyethyleneimine-oligonucleotide fluorescent polyplex imaging probes can distinguish pluripotent stem cells from heterogeneous cells within 30 min by sensing specific target miRNAs associated with pluripotency of human induced pluripotent stem cells (hiPSCs) without affecting pluripotency.

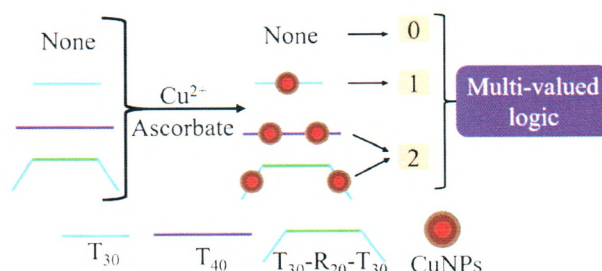
2545–2559

Simple, fast, label-free, and nanoquencher-free system for operating multivalued DNA logic gates using poly-thymine templated CuNPs as signal reporters

Daoqing Fan^{1,2}, Erkang Wang^{1,2}, and Shaojun Dong^{1,2,*}

¹ Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China



The first platform based on poly-thymine templated copper nanoparticles (CuNPs) for operating various label-free multi-valued DNA logic gates was constructed.

2560–2569

Ultrathin ZnS nanosheet/carbon nanotube hybrid electrode for high-performance flexible all-solid-state supercapacitor

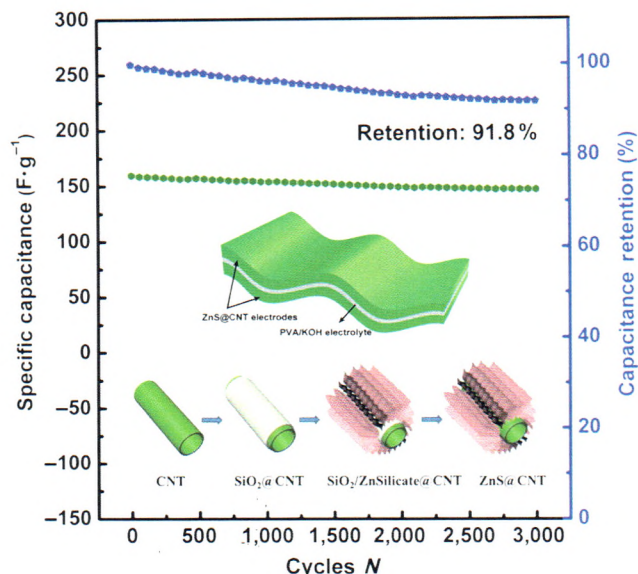
Xiaoyi Hou¹, Tao Peng¹, Jinbing Cheng¹, Qihong Yu¹, Rongjie Luo¹, Yang Lu¹, Xianming Liu², Jang-Kyo Kim³, Jun He⁴, and Yongsong Luo^{1,*}

¹ Xinyang Normal University, China

² Luoyang Normal University, China

³ Hong Kong University of Science and Technology, Hong Kong, China

⁴ National Center for Nanoscience and Technology, China



Hierarchical ultrathin ZnS nanosheet arrays supported on a C-nanotube surface are synthesized via a multistep hydrothermal approach and investigated as electrode materials for a supercapacitor and a flexible all-solid-state device.

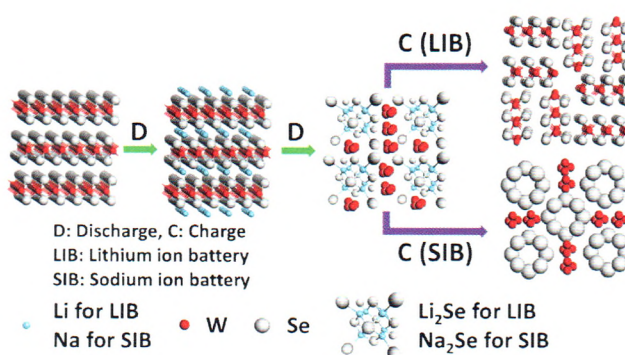
2570–2583

Tungsten diselenide nanoplates as advanced lithium/sodium ion electrode materials with different storage mechanisms

Wanfeng Yang¹, Jiawei Wang², Conghui Si¹, Zhangquan Peng^{2,*}, and Zhonghua Zhang^{1,*}

¹ Shandong University, China

² Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China



The *in situ* and *ex situ* studies confirmed that the WSe₂-nanoplate electrode had different lithium- and sodium-storage mechanisms.

2584–2598

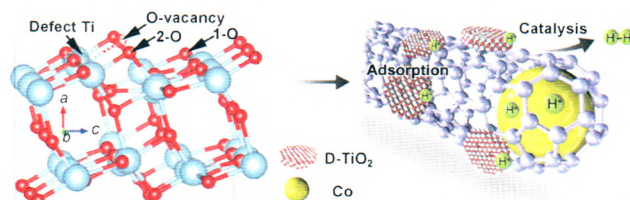
Enhanced electrocatalytic activity of Co@N-doped carbon nanotubes by ultrasmall defect-rich TiO₂ nanoparticles for hydrogen evolution reaction

Jiayuan Yu^{1,2}, Weijia Zhou^{1,*}, Tanli Xiong¹, Aili Wang^{1,2}, Shaowei Chen^{1,3}, and Benli Chu²

¹ South China University of Technology, China

² South China Normal University, China

³ University of California, USA



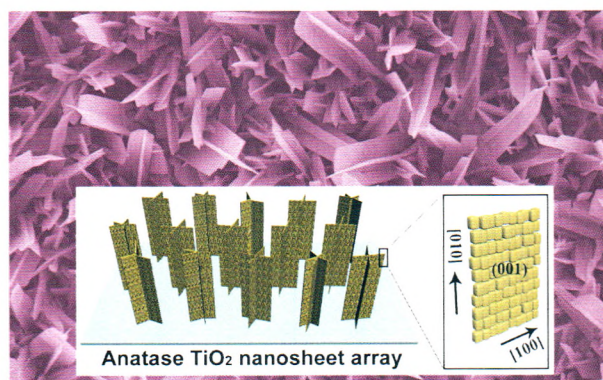
A durable and highly active electrochemical hydrogen-evolution reaction catalyst based on defect-rich TiO₂ nanoparticles loaded on Co nanoparticles@N-doped carbon nanotubes is synthesized by electrostatic spinning and a subsequent calcining process. It exhibits a small onset potential of -57.5 mV and a Tafel slope of 73.5 mV·dec⁻¹.

2599–2609

Mesocrystalline TiO₂ nanosheet arrays with exposed {001} facets: Synthesis via topotactic transformation and applications in dye-sensitized solar cells

Yanhe Zhang, Jinguang Cai, Yurong Ma, and Limin Qi*

Peking University, China



Vertically aligned arrays of mesocrystalline anatase TiO₂ nanosheets with exposed {001} facets were fabricated through a fluorine-free topotactic transformation approach. An efficiency of 8.85% was achieved for a dye-sensitized solar cell based on double-layered TiO₂ nanosheet arrays.

2610–2625

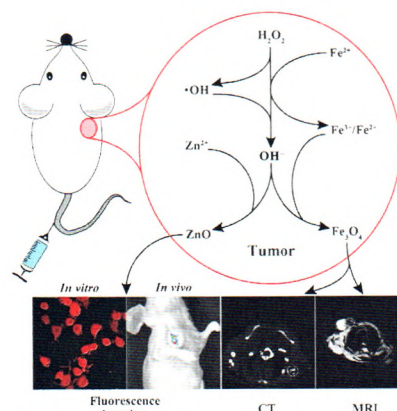
Rapid and multimodal *in vivo* bioimaging of cancer cells through *in situ* biosynthesis of Zn&Fe nanoclusters

Tianyu Du¹, Chunqiu Zhao¹, Fawad ur Rehman¹, Lanmei Lai¹, Xiaoqi Li², Yi Sun¹, Shouhua Luo¹, Hui Jiang¹, Matthias Selke³, and Xuemei Wang^{1,*}

¹ Southeast University, China

² Nanjing Foreign Language School, China

³ California State University, USA



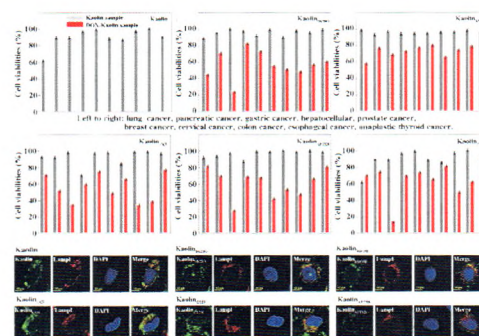
Fe^{2+} and Zn^{2+} were used to force cancer cells to spontaneously synthesize fluorescent ZnO nanoclusters and magnetic Fe_3O_4 nanoclusters, which could then be visualized using cancer multimodal imaging.

2626–2632

Intercalated 2D nanoclay for emerging drug delivery in cancer therapy

Yi Zhang, Mei Long, Peng Huang, Huaming Yang*, Shi Chang*, Yuehua Hu*, Aidong Tang, and Linfeng Mao

Central South University, China



Natural two-dimensional kaolinite nanoclay incorporated into an emerging drug delivery system could feasibly pave a way towards high-performance nanotherapeutics, with a high level of biocompatibility and very low toxicity towards pancreatic cancer, gastric cancer, prostate cancer, breast cancer, colorectal cancer, esophageal cancer, and differentiated thyroid cancer cells. Fluorescein isothiocyanate (FITC)-labeled original kaolinite (Kaolin) and Kaolin intercalation compounds (green) were shown to be gradually taken up by the cells and demonstrated good colocalization with lysosome (Lamp1, red).

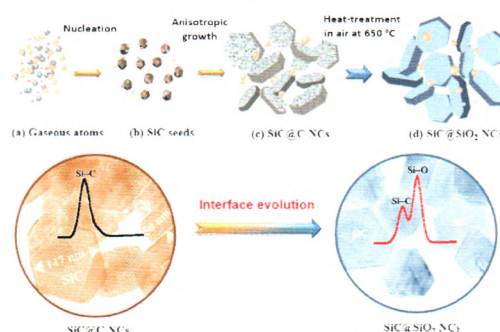
2633–2643

Interface evolution in the platelet-like SiC@C and SiC@SiO₂ monocrystal nanocapsules

Jian Gao¹, Jieyi Yu¹, Lei Zhou¹, Javid Muhammad¹, Xinglong Dong^{1,*}, Yinong Wang¹, Hongtao Yu¹, Xie Quan^{1,*}, Shaojie Li¹, and Youngguan Jung²

¹ Dalian University of Technology, China

² Kumoh National Institute of Technology, Republic of Korea



Carbon-coated SiC@C nanocapsules (NCs) with a hexagonal platelet-like morphology were fabricated by a simple direct current (DC) arc-discharge plasma method. The carbon shells of SiC@C NCs were subsequently converted into SiO_2 shells by a heat-treatment process at 650°C in air, during such a process the shape and inherent characters of crystalline SiC core were inherited.

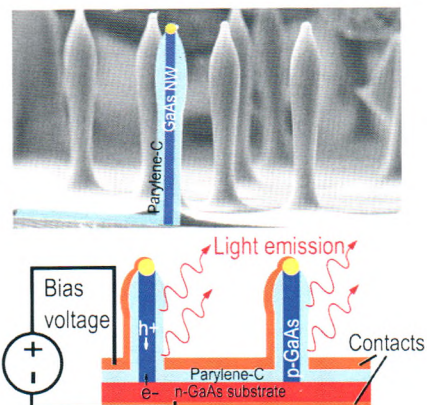
2644–2656

Nanowire encapsulation with polymer for electrical isolation and enhanced optical properties

Tuomas Haggren*, Ali Shah, Anton Autere, Joonas-Pekko Kakko, Veer Dhaka, Maria Kim, Teppo Huhtio, Zhipei Sun, and Harri Lipsanen*

Aalto University, Finland

2657–2666



Nanowire encapsulation with parylene-C is investigated. The encapsulation provides electrical insulation from the substrate, greatly reduces reflectance, improves the optical response of the nanowire array, and is suitable for various nanowire types.

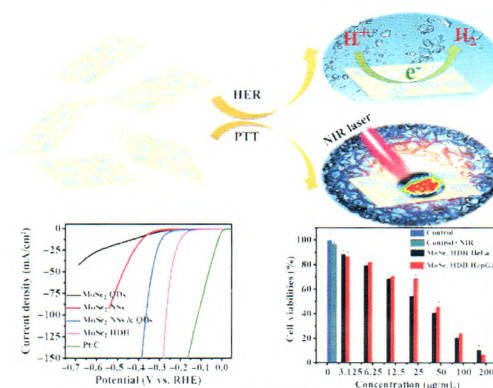
One-pot synthesis of MoSe₂ hetero-dimensional hybrid self-assembled by nanodots and nanosheets for electrocatalytic hydrogen evolution and photothermal therapy

Baoguang Mao¹, Tao Bao², Jie Yu², Lirong Zheng², Jinwen Qin¹, Wenyan Yin^{2,*}, and Minhua Cao^{1,*}

¹ Beijing Institute of Technology, China

² Institute of High Energy Physics, Chinese Academy of Sciences, China

2667–2682



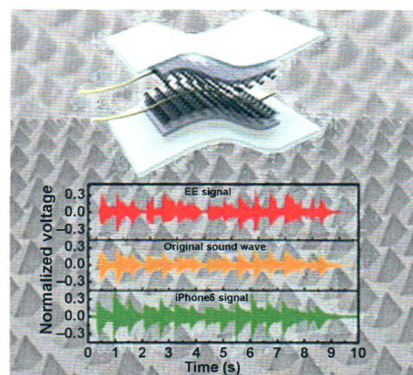
Molybdenum selenide hetero-dimensional hybrid (MoSe₂ HDH) self-assembled by nanodots and nanosheets was first reported. The MoSe₂ HDH displays excellent hydrogen evolution reaction activity and possesses not only remarkable photothermal therapy effect for cancer but also significant X-ray computed tomography/photoacoustic imaging signal enhancement.

Flexible electronic eardrum

Yang Gu, Xuewen Wang, Wen Gu, Yongjin Wu, Tie Li, and Ting Zhang*

Suzhou Institute of Nano-Tech and Nano-Bionics, China

2683–2691

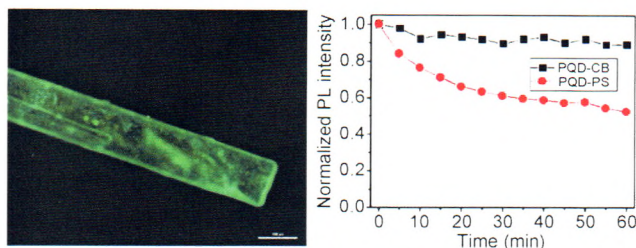


Flexible electronic eardrum is achieved by combining a polyethylene (PE)–polydimethylsiloxane (PDMS) bilayer with a single-walled carbon nanotube (SWNT) ultrathin film and a micro-pyramid structure. The device demonstrates superior sensitivity, stability, and high frequency response for recording and recognizing voice and may be used as a low-cost implantable acoustical bioelectronics device.

Embedding lead halide perovskite quantum dots in carboxybenzene microcrystals improves stability

Wei Xu, Zhixiong Cai, Feiming Li, Jing Dong, Yiru Wang, Yaqi Jiang, and Xi Chen*

Xiamen University, China



Incorporation of MAPbBr₃ QDs into carboxybenzene crystals is demonstrated. The mixed crystals exhibited strong photoluminescence and high stability to moisture and photodegradation. The strategy used is facile and efficient and can be extended to protect other oil-phase-synthesized QDs.

2692–2698

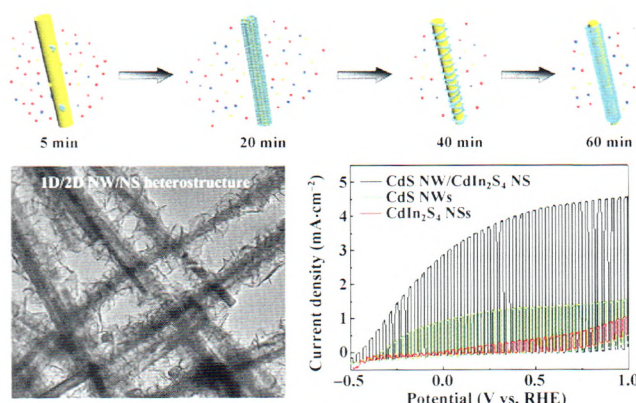
Multidimensional CdS nanowire/CdIn₂S₄ nanosheet heterostructure for photocatalytic and photoelectrochemical applications

Ting Wang¹, Yuanyuan Chai¹, Dekun Ma^{1,*}, Wei Chen¹, Weiwei Zheng^{2,*}, and Shaoming Huang^{1,3,*}

¹ Wenzhou University, China

² Syracuse University, USA

³ Guangdong University of Technology, China



A multidimensional CdS nanowire/CdIn₂S₄ nanosheet heterostructure exhibits enhanced photocatalytic and photoelectrochemical activities because of type II band alignment and its unique one-dimensional (1D)/two-dimensional (2D) architecture.

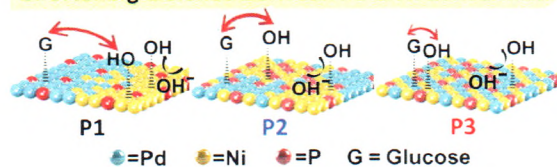
2699–2711

Ternary Pd–Ni–P nanoparticle-based nonenzymatic glucose sensor with greatly enhanced sensitivity achieved through active-site engineering

Jingwen Ma, Yueguang Chen, Lin Chen, and Leyu Wang*

Beijing University of Chemical Technology, China

Shortening distance between Pd & Ni active sites



Enhancing sensitivity & stability

A Pd–Ni–P ternary nanocatalyst-based glucose sensor with a greatly improved sensitivity and stability is fabricated by reducing the distance between the Pd and Ni active sites.

2712–2720

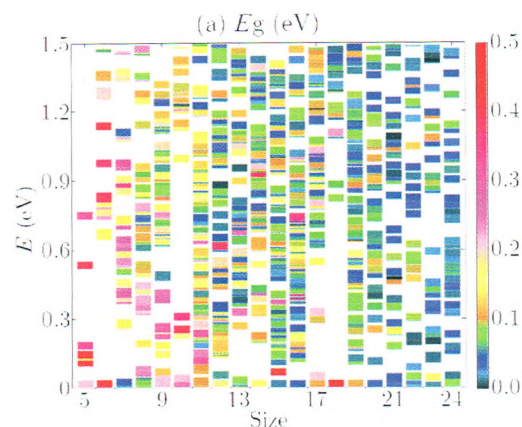
Glass-like energy and property landscape of Pt nanoclusters

Zhanghui Chen^{1,2}, Jingbo Li², Shushen Li², and Lin-Wang Wang^{1,*}

¹ Lawrence Berkeley National Laboratory, USA

² Institute of Semiconductors, Chinese Academy of Sciences, China

2721–2731



Using global search and data mining methods, the energy and property landscape of Pt nanoclusters are found to be glass-like.

Epitaxial growth of large-area and highly crystalline anisotropic ReSe₂ atomic layer

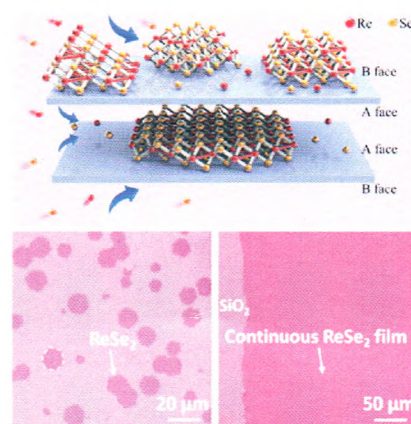
Fangfang Cui¹, Xiaobo Li¹, Qingliang Feng², Jianbo Yin², Lin Zhou³, Dongyan Liu¹, Kaiqiang Liu¹, Xuexia He¹, Xing Liang¹, Shengzhong Liu¹, Zhibin Lei¹, Zonghuai Liu¹, Hailin Peng², Jin Zhang², Jing Kong³, and Hua Xu^{1,*}

¹ Shaanxi Normal University, China

² Peking University, China

³ Massachusetts Institute of Technology, USA

2732–2742



Anisotropic two-dimensional (2D) layered rhenium diselenide (ReSe₂) with a high crystal quality and uniform monolayer thickness is synthesized via epitaxial growth with a confined reaction space. The as-grown ReSe₂ exhibits superior electrical and near-infrared photoresponse properties.

Biocompatible custom ceria nanoparticles against reactive oxygen species resolve acute inflammatory reaction after intracerebral hemorrhage

Dong-Wan Kang¹, Chi Kyung Kim^{1,2}, Han-Gil Jeong¹, Min Soh^{3,4}, Taeho Kim^{3,4}, In-Young Choi¹, Seul-Ki Ki¹, Do Yeon Kim¹, Wookjin Yang¹, Taeghwan Hyeon^{3,4}, and Seung-Hoon Lee^{1,*}

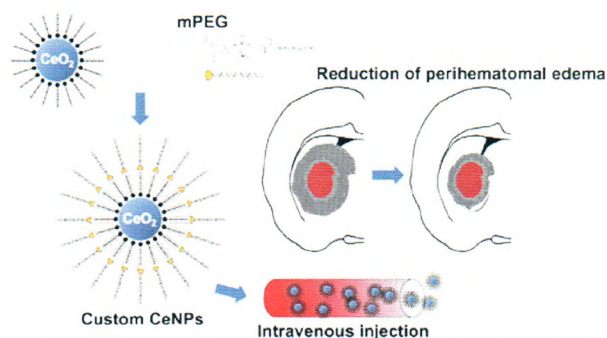
¹ Seoul National University Hospital, Republic of Korea

² Korea University Guro Hospital and Korea University College of Medicine, Republic of Korea

³ Institute for Basic Science (IBS), Republic of Korea

⁴ Seoul National University, Republic of Korea

2743–2760



Biocompatible custom-made ceria nanoparticles significantly reduce perihematomal edema formation by attenuating inflammation and oxidative injury in an intracerebral hemorrhage model. Intravenously administered ceria nanoparticles pass through the damaged blood-brain barrier, and are strongly recruited to the perihematomal area, where they can exert maximum protective effect.

Transformation of monolayer MoS₂ into multiphase MoTe₂: Chalcogen atom-exchange synthesis route

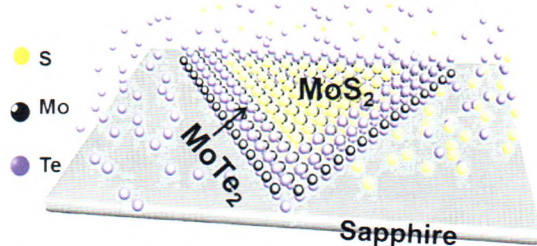
Qiyi Fang¹, Zhepeng Zhang¹, Qingqing Ji¹, Siya Zhu¹, Yue Gong^{2,3,4}, Yu Zhang¹, Jianping Shi¹, Xiebo Zhou¹, Lin Gu^{2,3,4}, Qian Wang¹, and Yanfeng Zhang^{1,*}

¹ Peking University, China

² Institute of Physics, Chinese Academy of Sciences, China

³ Collaborative Innovation Center of Quantum Matter, China

⁴ University of Chinese Academy of Sciences, China



We developed a chalcogen atom-exchange synthesis route for synthesizing monolayer multiphase MoTe₂ from monolayer MoS₂ and examined the growth process. This method provides a controllable approach for fabricating monolayer MoTe₂. We also conducted an in-depth study of the phase transformation of the monolayer transition-metal dichalcogenide.

2761–2771

Ultrahigh quantum efficiency photodetector and ultrafast reversible surface wettability transition of square In₂O₃ nanowires

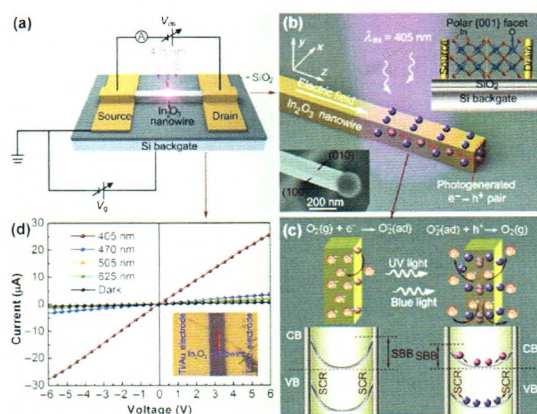
Ming Meng^{1,2}, Xinglong Wu^{2,*}, Xiaoli Ji², Zhixing Gan³, Lizhe Liu², Jiancang Shen², and Paul K. Chu⁴

¹ Zhoukou Normal University, China

² Nanjing University, China

³ Nanjing Normal University, China

⁴ City University of Hong Kong, Hong Kong, China



Ultralong In₂O₃ nanowires (NWs) with exposed {001} facets and uniform diameters were fabricated, and a single NW was assembled into a high-performance photodetector. An ultrahigh external quantum efficiency of $1.46 \times 10^9\%$ was obtained, which is the highest among reported In₂O₃-based photodetectors.

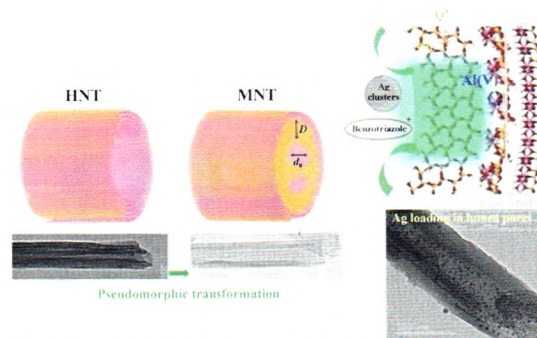
2772–2781

Engineering a tubular mesoporous silica nanocontainer with well-preserved clay shell from natural halloysite

Liangjie Fu^{1,2}, Huaming Yang^{1,*}, Aidong Tang¹, and Yuehua Hu^{1,*}

¹ Central South University, China

² University of California Davis, USA



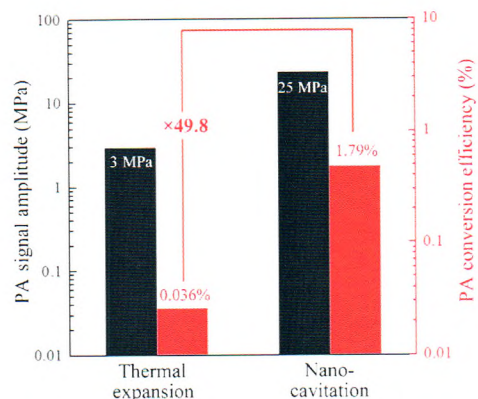
Well-defined mesoporous nanotubes with a tunable mesoporous silica inner shell and a preserved clay outer shell were obtained by exploiting the chemical components and morphology of natural clay. Using density functional theory calculations, the structure and energetics of Al leaching and Si condensation were analyzed in detail. The mesoporous silica nanotubes had numerous active Al(V) species and a large surface area up to 583 m²/g (increased by a factor of 10). They are promising candidates as drug-loading nanocontainers and nanoreactors.

2782–2799

New insight into photoacoustic conversion efficiency by plasmon-mediated nanocavitation: Implications for precision theranostics

Yujiao Shi, Sihua Yang*, and Da Xing*

South China Normal University, China



Plasmon-mediated nanocavitation induces an ultrahigh photoacoustic conversion efficiency compared with the thermal-expansion mechanism.

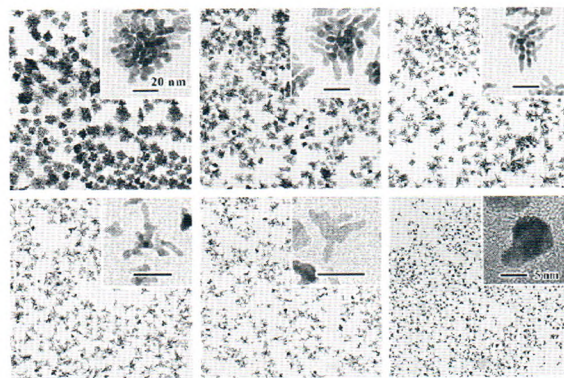
2800–2809

Facile ultrafine copper seed-mediated approach for fabricating quasi-two-dimensional palladium-copper bimetallic trigonal hierarchical nanoframes

Min Shen^{1,2}, Yuanbiao Huang¹, Dongshuang Wu¹, Jian Lü¹, Minna Cao¹, Meimei Liu¹, Yinglong Yang¹, Hongfang Li¹, Binbin Guo¹, and Rong Cao^{1,*}

¹ Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China



We develop a facile ultrafine sub-3 nm Cu seed-mediated approach for fabricating Pd-Cu bimetallic trigonal hierarchical nanoframes (THNFs), whereby the size of the Pd-Cu THNFs is tuned from 45 to 5 nm.

2810–2822

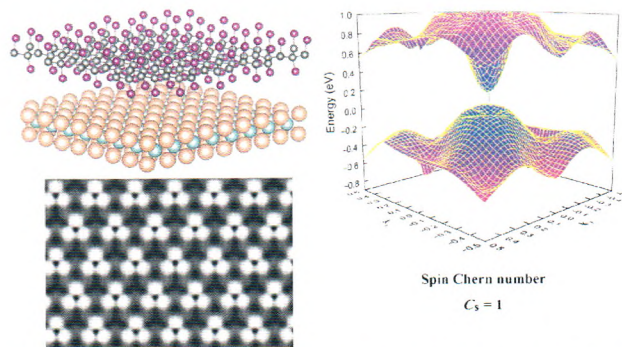
MoTe₂ is a good match for Gel by preserving quantum spin Hall phase

Xinru Li¹, Ying Dai^{1,*}, Chengwang Niu², Yandong Ma³, Wei Wei¹, and Baibiao Huang¹

¹ Shandong University, China

² Forschungszentrum Jülich and JARA, Germany

³ Jacobs University Bremen, Germany



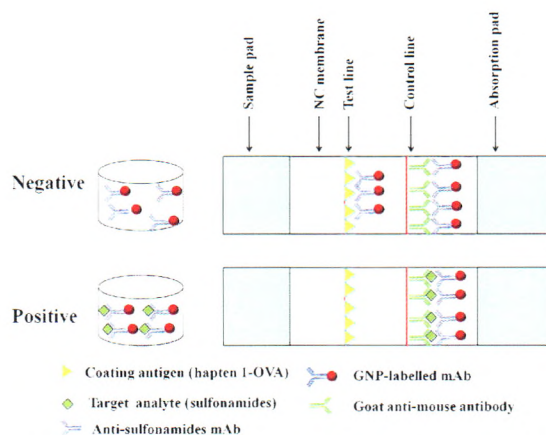
MoTe₂ is demonstrated via first-principles study to be a good match for a Gel monolayer because it preserves the nontrivial quantum spin Hall phase. The spin Chern number is directly calculated to be -1 . The sizable bandgap is 0.24 eV and can be detected at room temperature.

2823–2832

Gold immunochromatographic sensor for the rapid detection of twenty-six sulfonamides in foods

Yanni Chen, Liqiang Liu, Liguang Xu, Shanshan Song, Hua Kuang*, Gang Cui, and Chuanlai Xu

Jiangnan University, China



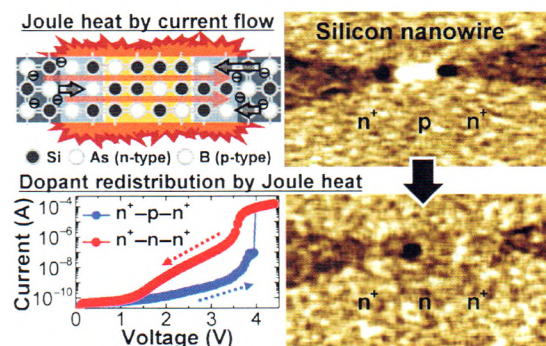
A gold immunochromatographic sensor (GICS) was developed for the rapid detection of twenty-six sulfonamides in honey samples.

2833–2844

On-the-fly dopant redistribution in a silicon nanowire p–n junction

Dong-II Moon*, Myeong-Lok Seol, Jin-Woo Han, and M. Meyyappan

NASA Ames Research Center, USA



Migration of dopants and resultant failure are directly observed in a silicon nanowire p–n junction for the first time. The nanowire temperature is found to increase enough to cause dopant diffusion, and scanning capacitance microscopy results clearly show the smearing of the dopant from the original profile.

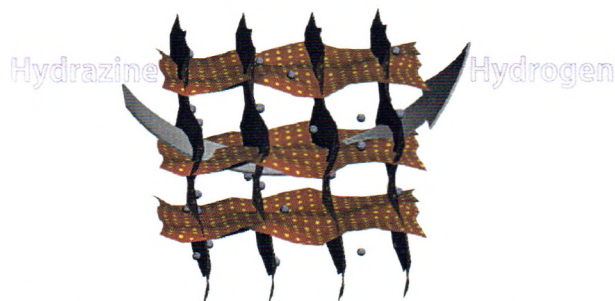
2845–2855

Nitrogen-doped graphene hydrogel-supported NiPt–CeO_x nanocomposites and their superior catalysis for hydrogen generation from hydrazine at room temperature

Xiaoqiong Du¹, Chao Liu¹, Cheng Du¹, Ping Cai¹, Gongzhen Cheng¹, and Wei Luo^{1,2,*}

¹ Wuhan University, China

² Nankai University, China



NiPt–CeO_x nanocomposites supported by three-dimensional nitrogen-doped graphene hydrogels (NGHs) exhibit a superior catalytic activity for hydrogen generation from an alkaline solution of hydrazine at room temperature, with the turnover frequency (TOF) value of 408 h^{−1}.

2856–2865

Facile synthesis of fully ordered $L1_0$ -FePt nanoparticles with controlled Pt-shell thicknesses for electrocatalysis

Yonghoon Hong¹, Hee Jin Kim², Daehee Yang¹, Gaehang Lee³, Ki Min Nam⁴, Myung-Hwa Jung¹, Young-Min Kim^{5,6,*}, Sang-Il Choi^{2,*}, and Won Seok Seo^{1,*}

¹ Sogang University, Republic of Korea

² Kyungpook National University, Republic of Korea

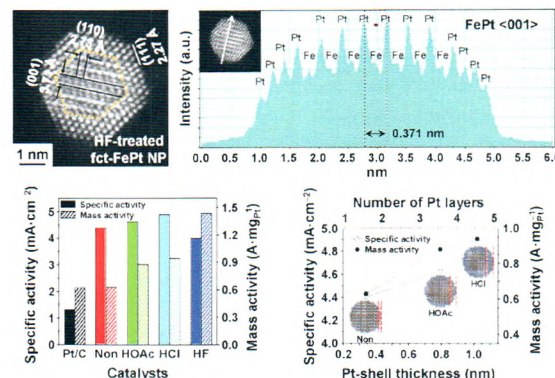
³ Korea Basic Science Institute and University of Science and Technology, Republic of Korea

⁴ Mokpo National University, Republic of Korea

⁵ Institute for Basic Science (IBS), Republic of Korea

⁶ Sungkyunkwan University (SKKU), Republic of Korea

2866–2880



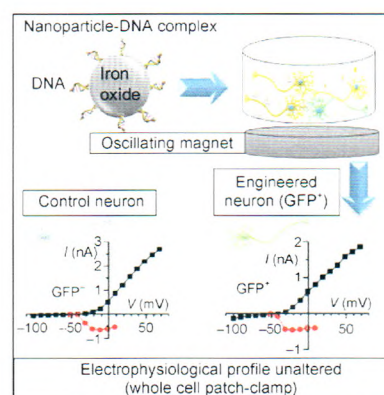
We controlled the Pt-shell thickness of fully $L1_0$ -ordered face-centered tetragonal (fct) FePt nanoparticles (NPs) by using several acids with different acid strengths for surface-Fe etching and studied the effects of both surface-Fe etching and Pt-shell thickness on the electrocatalytic properties of fct-FePt NPs for the methanol oxidation reaction (MOR).

Electrophysiological assessment of primary cortical neurons genetically engineered using iron oxide nanoparticles

Michael G. Evans, Arwa Al-Shakli, Stuart I. Jenkins, and Divya M. Chari*

Keele University, UK

2881–2890



An electrophysiological study of neurons genetically engineered using iron oxide nanoparticles reveals the high safety of this approach.

Unveiling the controversial mechanism of reversible Na storage in TiO_2 nanotube arrays: Amorphous versus anatase TiO_2

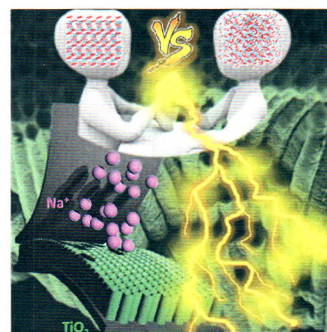
Federico Bella^{1,*}, Ana B. Muñoz-García², Giuseppina Meligrana¹, Andrea Lamberti¹, Matteo Destro³, Michele Pavone², and Claudio Gerbaldi^{1,*}

¹ Politecnico di Torino, Italy

² University of Naples Federico II, Italy

³ LITHOPS S.r.l., Italy

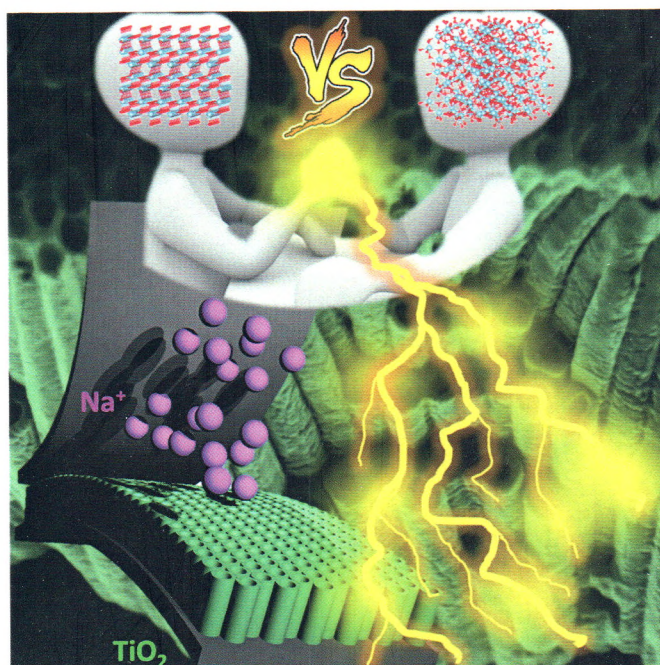
2891–2903



This work presents an electrochemical, structural, and theoretical investigation of the controversial mechanism of reversible Na^+ storage in TiO_2 nanotube arrays, with the aim of showing the potential of these systems as anode materials for sodium-ion batteries.

Erratum to: A highly sensitive chemical gas detecting transistor based on highly crystalline CVD-grown MoSe_2 films (DOI 10.1007/s12274-016-1291-7)

2904



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