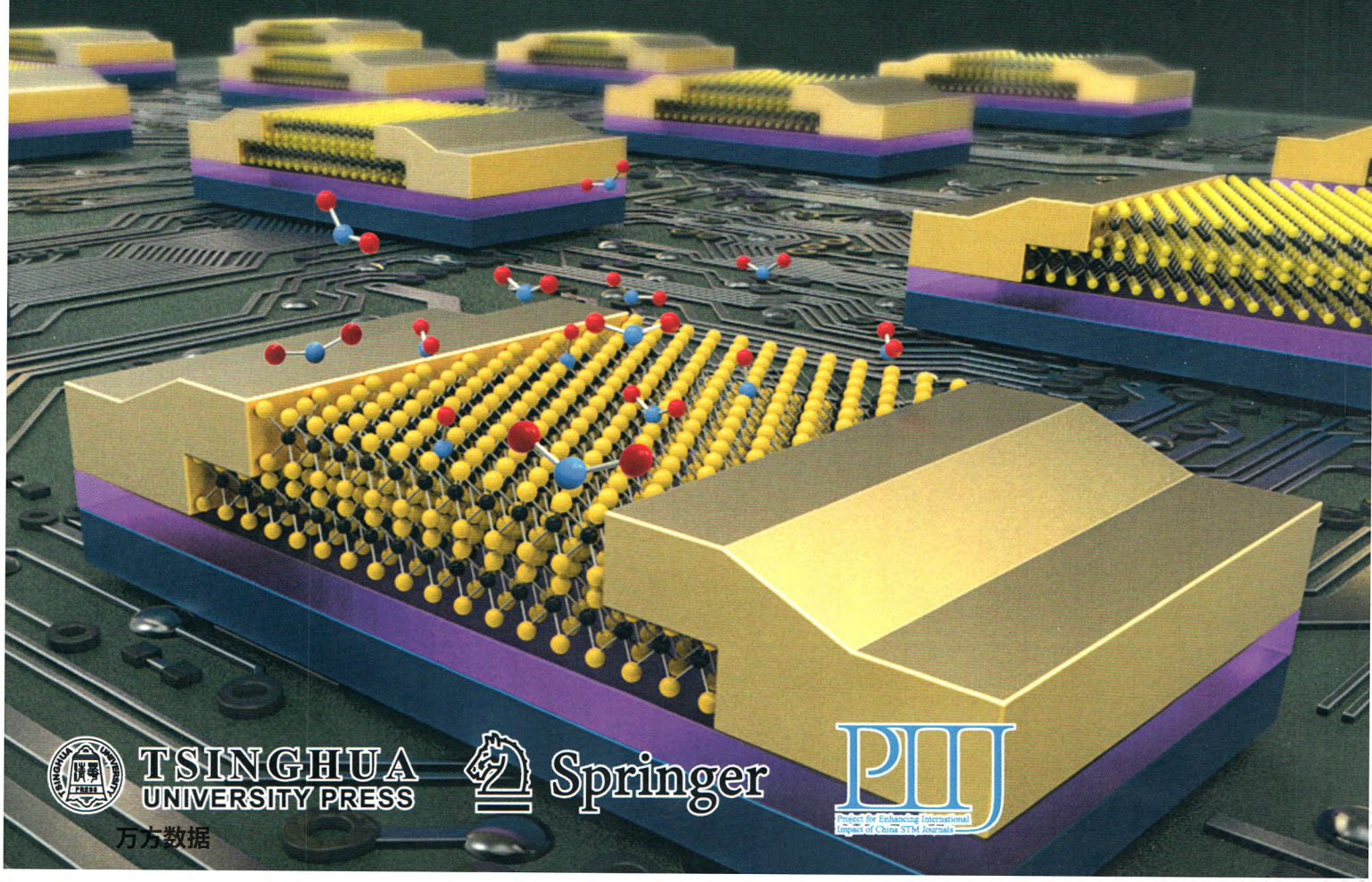
June· 2017
Volume 10 · Number 6

Nano Research

A highly sensitive chemical gas detecting transistor based on highly crystalline CVD-grown $MoSe_2$ films

Broadband photovoltaic effect of n-type topological insulator Bi_2Te_3 films on p-type Si substrates

Graphene-carbon nanotube hybrid films for high-performance flexible photodetectors



TSINGHUA UNIVERSITY PRESS
Springer
PIIJ
Project for Enhancing International Impact of China STM Journals

Nano Research
Vol. 10, No. 6, June 2017
ISSN 1998-0124
CN 11-5974/O4

Contents

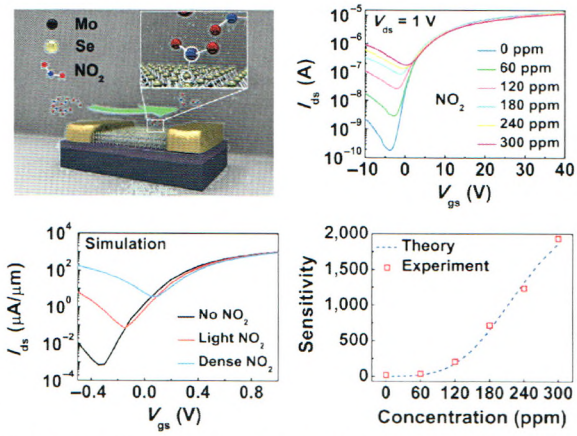
Research Articles

A highly sensitive chemical gas detecting transistor based on highly crystalline CVD-grown $MoSe_2$ films

Jongyeol Baek[1], Demin Yin[2], Na Liu[1], Inturu Omkaram[1], Chulseung Jung[1], Healin Im[1], Seongin Hong[1], Seung Min Kim[3], Young Ki Hong[1], Jaehyun Hur[4,*], Youngki Yoon[2,*], and Sunkook Kim[1,*]

[1] Kyung Hee University, Republic of Korea
[2] University of Waterloo, Canada
[3] Korea Institute of Science and Technology (KIST), Republic of Korea
[4] Gachon University, Republic of Korea

1861–1871



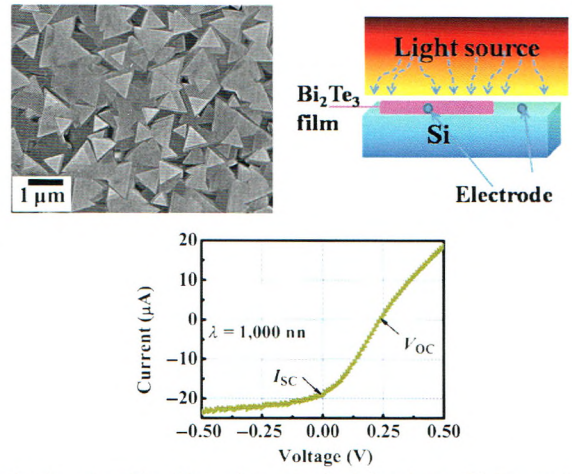
A highly sensitive chemical vapor deposited multilayer $MoSe_2$ field-effect transistor (FET) for a NO_2 gas sensor is demonstrated. The sensor exhibits ultra-high sensitivity, real-time response, and fast on–off switching. Device modeling and quantum transport simulations reveal that the variation of gap states in the $MoSe_2$ with NO_2 concentration is the key mechanism in $MoSe_2$ FET-based NO_2 gas sensors.

Broadband photovoltaic effect of n-type topological insulator Bi_2Te_3 films on p-type Si substrates

Zhenhua Wang[1,2], Mingze Li[1,2], Liang Yang[1,2], Zhidong Zhang[1,2,*], and Xuan P. A. Gao[3,*]

[1] Institute of Metal Research, Chinese Academy of Sciences, China
[2] University of Science and Technology of China, China
[3] Case Western Reserve University, USA

1872–1879



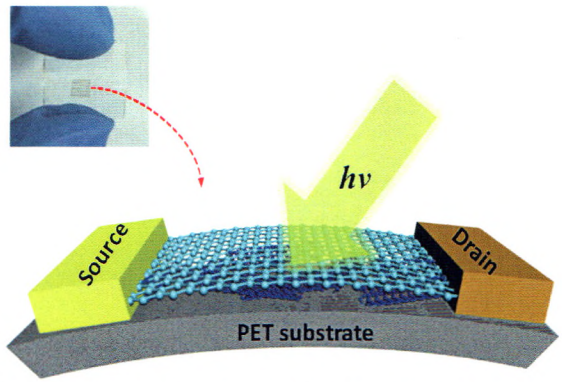
Synthesis of a thin film of topological insulator Bi_2Te_3 and the schematic of the fabricated n-Bi_2Te_3/p-Si photodetector device are demonstrated. The photovoltaic effect under light illumination is illustrated by measuring the I–V characteristics.

TSINGHUA UNIVERSITY PRESS Springer

Graphene-carbon nanotube hybrid films for high-performance flexible photodetectors

Yujie Liu, Yuanda Liu, Shuchao Qin, Yongbing Xu, Rong Zhang, and Fengqiu Wang*

Nanjing University, China



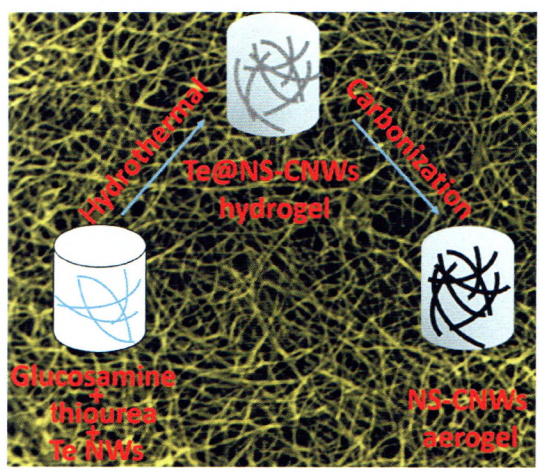
A flexible photodetector is based on graphene-carbon nanotube hybrid films with high photosensitivity in the visible range. The device remains stable under severe bending conditions and cyclic bending tests.

1880–1887

Template-directed synthesis of nitrogen- and sulfur-codoped carbon nanowire aerogels with enhanced electrocatalytic performance for oxygen reduction

Shaofang Fu[1], Chengzhou Zhu[1], Junhua Song[1], Mark H. Engelhard[2], Xiaolin Li[2], Peina Zhang[3], Haibing Xia[3], Dan Du[1], and Yuehe Lin[1,2,*]

[1] Washington State University, USA
[2] Pacific Northwest National Laboratory, USA
[3] Shandong University, China



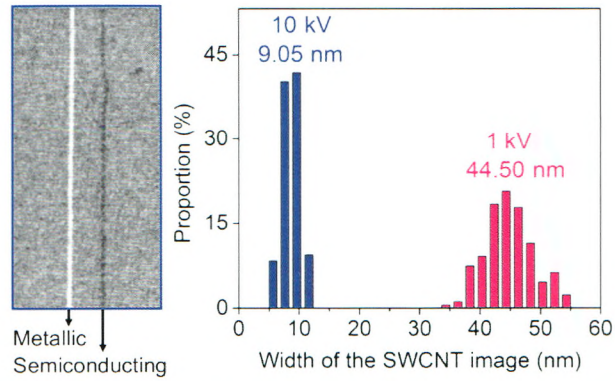
Te@N,S-codoped carbon nanowire (NS-CNW) hydrogels were synthesized via hydrothermal treatment and subsequent thermal annealing, and they showed enhanced catalytic performance for the oxygen reduction reaction.

1888–1895

Direct discrimination between semiconducting and metallic single-walled carbon nanotubes with high spatial resolution by SEM

Dongqi Li[1], Yang Wei[1,*], Jin Zhang[1], Jiangtao Wang[1], Yinghong Lin[3], Peng Liu[1], Shoushan Fan[1,2], and Kaili Jiang[1,2,*]

[1] Tsinghua University, China
[2] Collaborative Innovation Center of Quantum Matter, China
[3] FEI Company, China



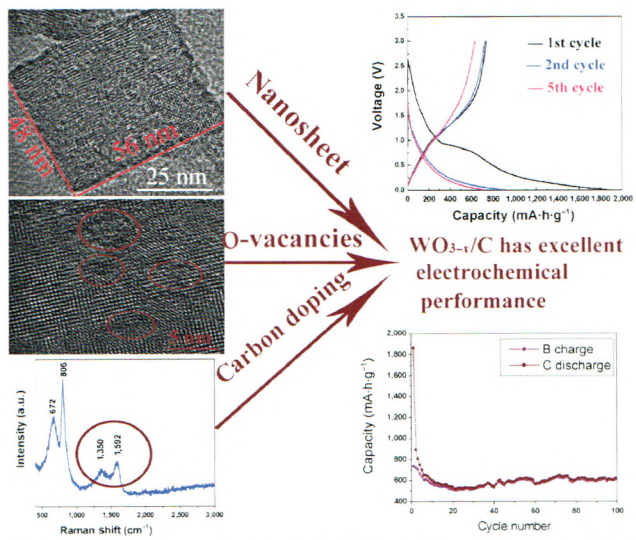
By modulating surface charge, scanning electron microscopy (SEM) can directly discriminate between semiconducting and metallic single-walled carbon nanotube (SWCNTs) based on their black and white colors with a spatial resolution of ~9 nm.

1896–1902

Preparation and electrochemical characterization of ultrathin WO_{3-x}/C nanosheets as anode materials in lithium ion batteries

Keyan Bao[1,2], Wutao Mao[1], Guangyin Liu[1], Liqun Ye[1], Haiquan Xie[1], Shufang Ji[2], Dingsheng Wang[2], Chen Chen[2,*], and Yadong Li[2]

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



With the merits of two-dimensional (2D) nanomaterials, O-vacancies, and carbon doping, the WO_{3-x}/C ultrathin 2D nanomaterial is expected to exhibit excellent electrochemical performance. Here, ultrathin WO_{3-x}/C nanosheets were prepared that showed good electrochemical performance, with an initial discharge capacity of 1,866 mA·h·g^{-1} at a current density of 200 mA·g^{-1}.

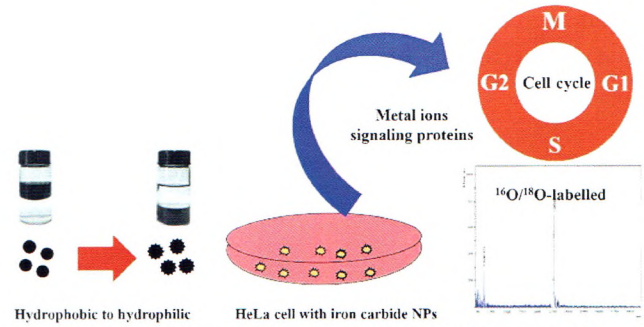
1903–1911

Biocompatibility of iron carbide and detection of metals ions signaling proteomic analysis via HPLC/ESI-Orbitrap

Murtaza Hasan[1], Wenlong Yang[1], Yanmin Ju[1], Xin Chu[1], Yun Wang[2], Yulin Deng[2], Nasir Mahmood[1], and Yanglong Hou[1,*]

[1] Peking University, China
[2] Beijing Institute of Technology, China

1912–1923



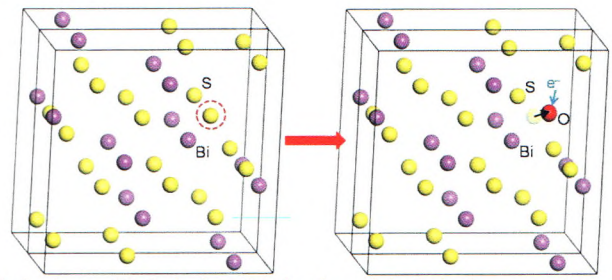
A novel approach was designed to determine the biocompatibility of Fe_2C nanoparticles (NPs) and detect metal ion signaling biomarker proteins via high performance liquid chromatography/electrospray ionization with ion trap mass analyzer (HPLC/ESI-Orbitrap) and ^{18}O labeling techniques.

Atomic origin of the traps in memristive interface

Ye Tian[1,2,5], Lida Pan[3,4], Chuan Fei Guo[6], and Qian Liu[1,*]

[1] National Center for Nanoscience and Technology, China
[2] Hunan City University, China
[3] Vanderbilt University, USA
[4] Institute of Physics, Chinese Academy of Sciences, China
[5] Ghent University-IMEC, Belgium
[6] South University of Science and Technology of China, China

1924–1931



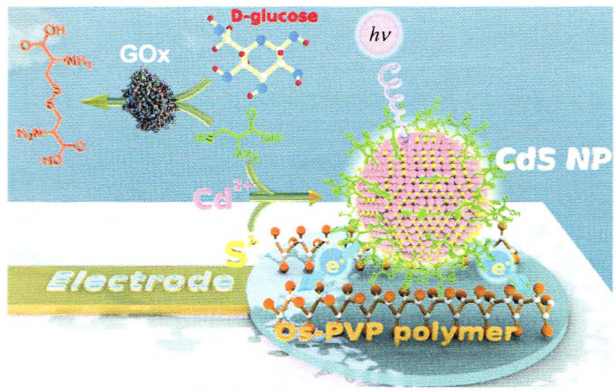
O-doping to Bi_2S_3 is found to be the origin-inducing memristance at the interface between F-doped SnO_2 (FTO) and Bi_2S_3 nanonetworks (BSNN).

Modulating the growth of cysteine-capped cadmium sulfide quantum dots with enzymatically produced hydrogen peroxide

Ruta Grinyte, Javier Barroso, Laura Saa, and Valeri Pavlov*

Parque Tecnológico de San Sebastian, Spain

1932–1941



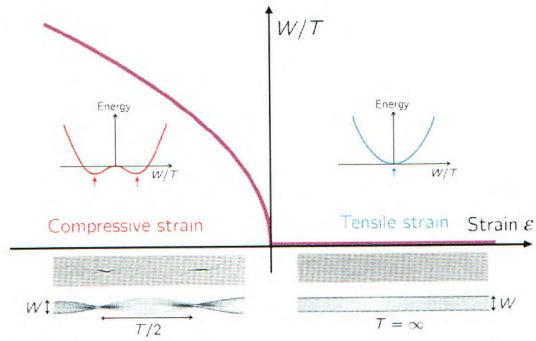
Enzymatically produced hydrogen peroxide oxidizes cysteine and modulates the growth of quantum dots. This system enables the quantification of glucose oxidase and glucose in human serum using fluorescence spectroscopy and photoelectrochemical analysis.

Spontaneous twisting of a collapsed carbon nanotube

Hamid Reza Barzegar[1,2,3,4], Aiming Yan[1,3,4], Sinisa Coh[1,3,†], Eduardo Gracia-Espino[2], Claudia Ojeda-Aristizabal[1,3,‡], Gabriel Dunn[1,3,4], Marvin L. Cohen[1,3], Steven G. Louie[1,3], Thomas Wågberg[2], and Alex Zettl[1,3,4,*]

[1] University of California, Berkeley, USA
[2] Umea University, Sweden
[3] Lawrence Berkeley National Laboratory, USA
[4] Kavli Energy NanoSciences Institute at the University of California, Berkeley and the Lawrence Berkeley National Laboratory, USA
† Present Address: University of California Riverside, USA
‡ Present Address: California State University Long Beach, USA

1942–1949



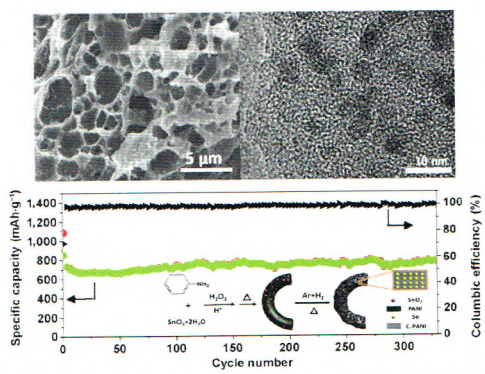
We study the collapse and subsequent spontaneous twisting of a carbon nanotube in vacuum by *in situ* transmission electron microscopy. Combined with a theoretical analysis, the results reveal that the twisting of a collapsed carbon nanotube is caused by compressive strain.

Ultrafine Sn nanocrystals in a hierarchically porous N-doped carbon for lithium ion batteries

Xinghua Chang, Teng Wang, Zhiliang Liu, Xinyao Zheng, Jie Zheng*, and Xingguo Li*

Peking University, China

1950–1958



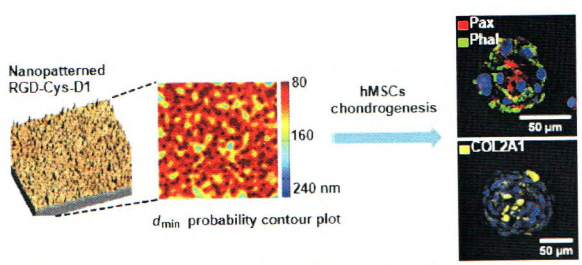
A simple method is developed to prepare ultrafine (~3 nm) Sn nanoparticles uniformly distributed in hierarchically porous carbon using low-cost starting materials. The nanocomposite shows high capacity and good rate capability in lithium-ion batteries because of its unique structure, which will promote the application of Sn based anode in lithium ion batteries.

Tailoring RGD local surface density at the nanoscale toward adult stem cell chondrogenic commitment

Anna Lagunas[1,2,*], Iro Tsintzou[2], Yolanda Vida[3,4], Daniel Collado[3,4], Ezequiel Pérez-Inestrosa[3,4], Cristina Rodríguez Pereira[5], Joana Magalhaes[1,5], José A. Andrades[3,1], and Josep Samitier[2,1,6]

[1] Networking Biomedical Research Center (CIBER), Spain
[2] Institute for Bioengineering of Catalonia (IBEC), Spain
[3] Universidad de Málaga (UMA), Spain
[4] Parque Tecnológico de Andalucía, Spain
[5] Universidade da Coruña (UDC), Spain
[6] University of Barcelona (UB), Spain

1959–1971



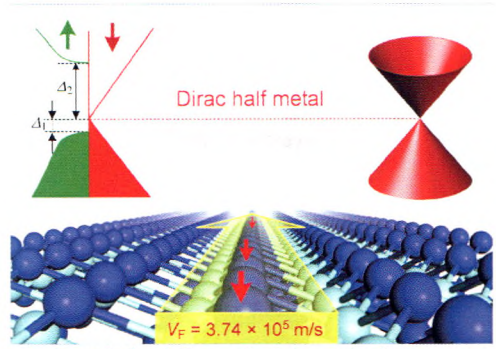
Arginine-glycine-aspartic acid (RGD)-tailored dendrimers were used to create uneven distributions of RGD on poly(L-lactic acid) with tunable local ligand densities depending on the initial bulk concentration. The control of RGD local surface density at the nanoscale acts as a regulator of chondrogenic commitment: substrates presenting intermediate cell adhesiveness favor cell condensation and the early chondrogenic differentiation of adult mesenchymal stem cells.

YN_2 monolayer: Novel p-state Dirac half metal for high-speed spintronics

Zhifeng Liu[1,2], Junyan Liu[1], and Jijun Zhao[2,3,*]

[1] Inner Mongolia University, China
[2] Beijing Computational Science Research Center, China
[3] Dalian University of Technology, China

1972–1979



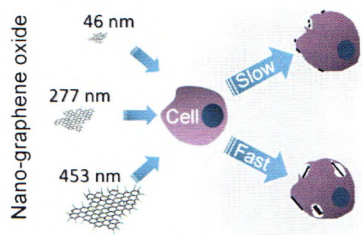
Based on spin-polarized first-principles calculations, we propose a desirable p-state Dirac half metal, i.e., 1T-YN_2 monolayer, which has a large Fermi velocity, wide half-metallic gap, and high Curie temperature.

Size and time dependent internalization of label-free nano-graphene oxide in human macrophages

Rafael G. Mendes[1,2], Angelo Mandarino[2], Britta Koch[2], Anne K. Meyer[2], Alicja Bachmatiuk[1,2,3], Cordula Hirsch[4], Thomas Gemming[2], Oliver G. Schmidt[2,5], Zhongfan Liu[1,6], and Mark H. Rümmeli[1,2,3,*]

[1] Soochow University, China
[2] Institute for Solid State and Materials Research, Germany
[3] Centre of Polymer and Carbon Materials, Polish Academy of Sciences, Poland
[4] EMPA-Swiss Federal Laboratories for Materials Science and Technology, Switzerland
[5] Chemnitz University of Technology, Germany
[6] Peking University, China

1980–1995



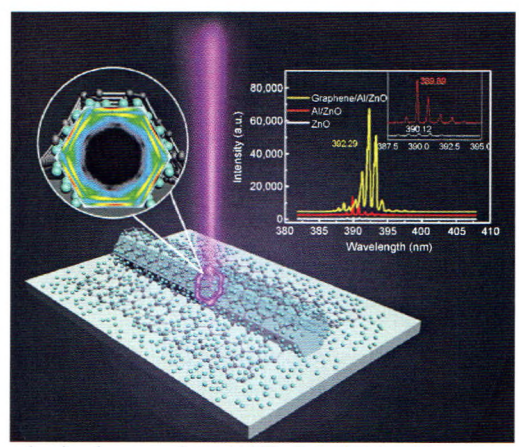
Uptake of three different size distributions of label-free graphene oxide was carefully tracked in human monocyte cells (THP-1) using electron microscopy. The data show clear size dependence. Larger flakes (and clusters) are taken up by the cells more easily than smaller flakes. Moreover, uptake is shown to occur very rapidly, within two min of incubation. The data highlight a crucial need for cellular incubation studies with nanoparticles to be conducted with short incubation periods as certain dependencies (e.g., size and concentration) are lost with long incubation periods.

Synergistic graphene/aluminum surface plasmon coupling for zinc oxide lasing improvement

Qiuxiang Zhu[1,2], Feifei Qin[1], Junfeng Lu[1], Zhu Zhu[1], Haiyan Nan[1], Zengliang Shi[1], Zhenhua Ni[1], and Chunxiang Xu[1,*]

[1] Southeast University, China
[2] Hunan City University, China

1996–2004



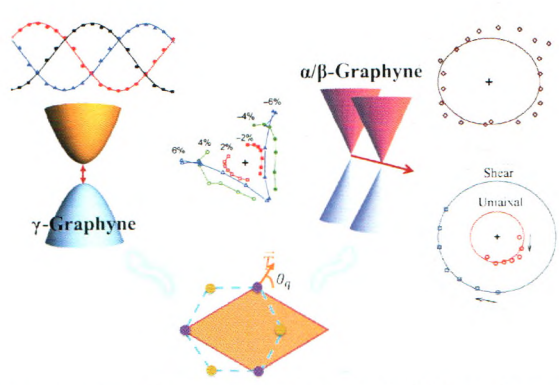
We synthesized a graphene/Al/ZnO hybrid whispering-gallery mode (WGM) cavity successfully and greatly improved the optical properties of the microcavity by synergistically coupling the graphene/Al surface plasmons with ZnO excitons.

Movement of Dirac points and band gaps in graphyne under rotating strain

Zhenzhu Li, Zhongfan Liu, and Zhirong Liu*

Peking University, China

2005–2020



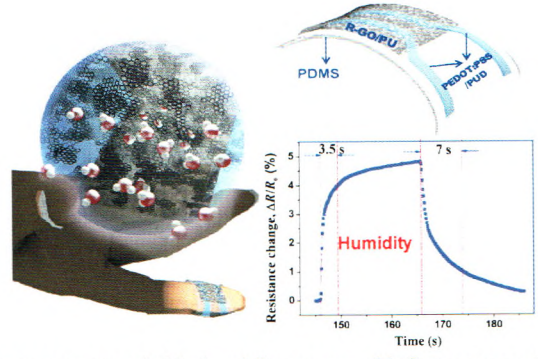
Graphene, where linear effects dominate, is different from α-, β-, and γ-graphynes. They exhibit strong nonlinear electronic responses under exerted strains, which are well described by a proposed unified theory.

Transparent, stretchable, and rapid-response humidity sensor for body-attachable wearable electronics

Tran Quang Trung[1], Le Thai Duy[1], Subramanian Ramasundaram[2], and Nae-Eung Lee[1,3,4,*]

[1] Sungkyunkwan University (SKKU), Republic of Korea
[2] Korea Institute of Science and Technology, Republic of Korea
[3] SKKU Advanced Institute of Nanotechnology (SAINT), Republic of Korea
[4] Samsung Advanced Institute for Health Sciences & Technology (SAIHST), Republic of Korea

2021–2033



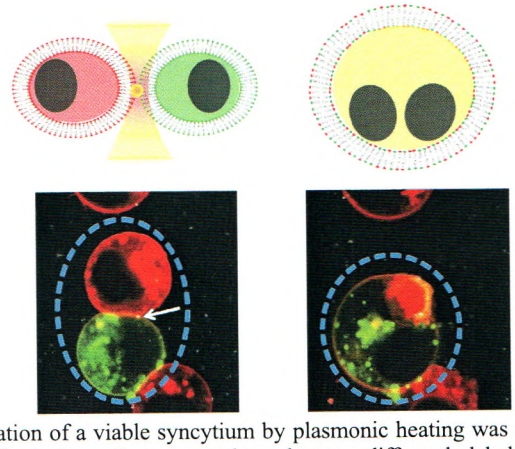
A transparent, stretchable humidity sensor with fast response (3.5 s) and relaxation time (7 s), high stability, and high stretchability of up to 60% has been demonstrated. The humidity sensor can be conformally attached to the human body for the continuous monitoring of the humidity or moisture levels of the human skin and the environment under various conditions. This device has immense potential for applications in wearable skin electronics and personal healthcare.

Hot-nanoparticle-mediated fusion of selected cells

Azra Bahadori, Lene B. Oddershede*, and Poul M. Bendix*

University of Copenhagen, Denmark

2034–2045



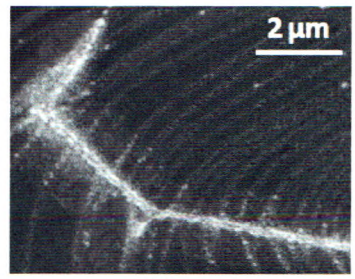
Formation of a viable syncytium by plasmonic heating was studied here. Optical trapping was used to select two differently labeled cells which were identified by confocal microscopy and subsequently fused by trapping a gold nanoparticle at the contact zone between the cells. The white arrow marks the location of the gold nanoparticle.

High-resolution characterization of hexagonal boron nitride coatings exposed to aqueous and air oxidative environments

Lanlan Jiang[1], Na Xiao[1], Bingru Wang[1], Enric Grustan-Gutierrez[1], Xu Jing[1], Petr Babor[2], Miroslav Kolíbal[2], Guangyuan Lu[3], Tianru Wu[3], Haomin Wang[2], Fei Hui[1], Yuanyuan Shi[1], Bo Song[1], Xiaoming Xie[3,4], and Mario Lanza[1,*]

[1] Soochow University, China
[2] Brno University of Technology, Czech Republic
[3] Shanghai Institute of Microsystems and Information Technology, Chinese Academy of Sciences, China
[4] Shanghai Tech University, China

2046–2055



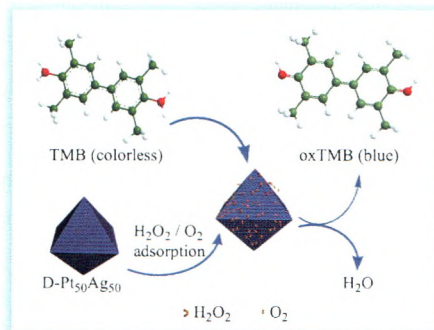
This work provides new insights into the passivating properties of mono and multilayer hexagonal boron nitride (h-BN) in both air and aqueous atmospheres. High resolution techniques reveal the occurrence of novel interactions between h-BN-protected metals and oxygen from the environment.

Porous Pt/Ag nanoparticles with excellent multifunctional enzyme mimic activities and antibacterial effects

Shuangfei Cai[1], Xinghang Jia[1], Qiusen Han[1], Xiyun Yan[2], Rong Yang[1,*], and Chen Wang[1,*]

[1] University of Chinese Academy of Sciences, China
[2] Institute of Biophysics, Chinese Academy of Sciences, China

2056–2069



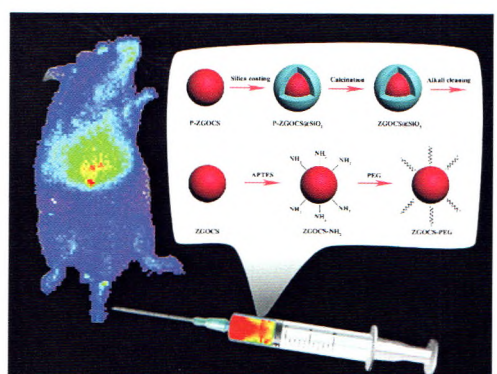
A series of porous Pt/Ag nanoparticles (NPs) were fabricated from monodisperse and homogenous Pt_xAg_{100-x} (x = 25, 50, 75) octahedra by a facile dealloying process. The dealloyed $Pt_{50}Ag_{50}$ NPs with Pt-rich surface structure and increased surface area showed remarkable enhancement in multiple enzyme mimic activities as well as excellent antibacterial effects on two model bacteria (*Escherichia coli* and *Staphylococcus aureus*).

Silica shell-assisted synthetic route for mono-disperse persistent nanophosphors with enhanced *in vivo* recharged near-infrared persistent luminescence

Rui Zou[1], Junjian Huang[1], Junpeng Shi[2], Lin Huang[1], Xuejie Zhang[1], Ka-Leung Wong[3,*], Hongwu Zhang[2,*], Dayong Jin[4,*], Jing Wang[1,*], and Qiang Su[1]

[1] Sun Yat-Sen University, China
[2] Institute of Urban Environment, Chinese Academy of Sciences, China
[3] Hong Kong Baptist University, China
[4] University of Technology Sydney, Australia

2070–2082



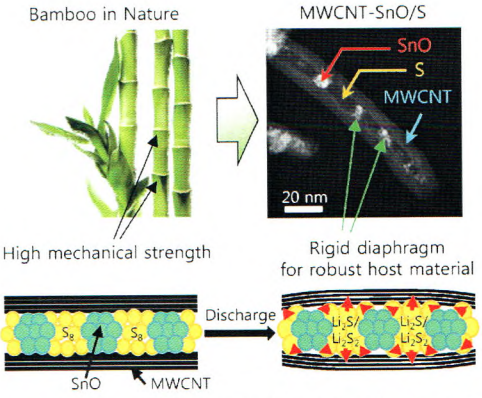
Highly dispersive $ZnGa_2O_4:Cr^{3+},Sn^{4+}$ (ZGOCS) nanoparticles with impressive near-infrared persistent luminescence are successfully obtained using a new three-step synthesis method. The remarkable persistent-luminescence performance demonstrates that the ZGOCS nanoparticles are suitable for long-term *in vivo* imaging applications.

Ordered SnO nanoparticles in MWCNT as a functional host material for high-rate lithium-sulfur battery cathode

A-Young Kim[1,2], Min Kyu Kim[1], Ji Young Kim[1], Yuren Wen[3], Lin Gu[3], Van-Duong Dao[4], Ho-Suk Choi[4], Dongjin Byun[2], and Joong Kee Lee[1,*]

[1] Korea Institute of Science and Technology, Republic of Korea
[2] Korea University, Republic of Korea
[3] Beijing National Laboratory for Condensed Matter Physics Institute of Physics, Chinese Academy of Sciences, China
[4] Chungnam National University, Republic of Korea

2083–2095



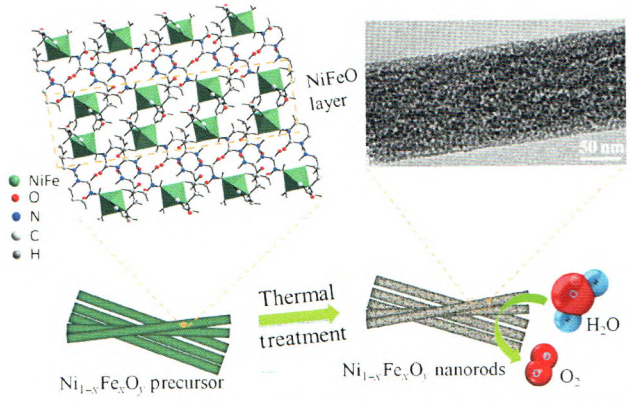
A novel hybrid electrode nanomaterial with a designed functional structure consisting of ordered SnO nanoparticles, multiwalled carbon nanotubes, and sulfur exhibits effective trapping of polysulfide and a good rate capability.

Mesoporous nickel–iron binary oxide nanorods for efficient electrocatalytic water oxidation

Guang Liu, Xusheng Gao, Kaifang Wang, Dongying He, and Jinping Li*

Taiyuan University of Technology, China

2096–2105



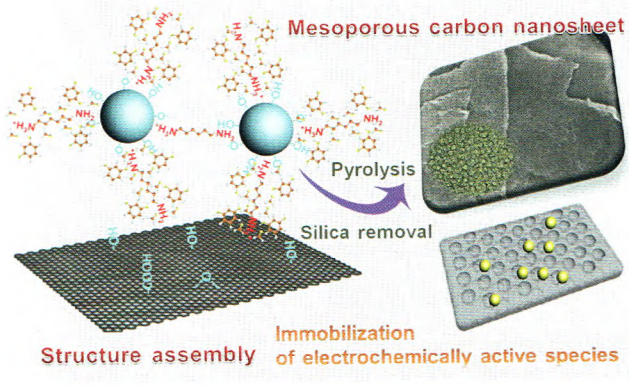
Mesoporous Ni–Fe binary-oxide nanorods with tailored Fe-doping contents and highly efficient water-oxidation activity were realized in an alkaline medium.

Fabrication of high-pore volume carbon nanosheets with uniform arrangement of mesopores

Shuai Wang, Fei Cheng, Peng Zhang, Wen-Cui Li, and An-Hui Lu*

Dalian University of Technology, China

2106–2116

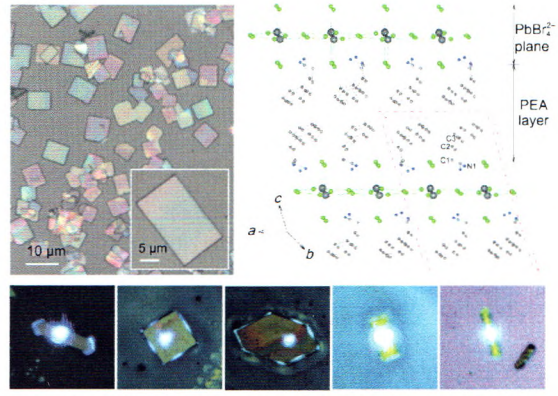


Mesoporous carbon nanosheets with embedded graphene and numerous uniformly distributed spherical mesopores (up to 3.5 $cm^3 \cdot g^{-1}$) are synthesized for electrochemical energy storage.

Single-crystal microplates of two-dimensional organic–inorganic lead halide layered perovskites for optoelectronics

Dewei Ma[1,2], Yongping Fu[1], Lianna Dang[1], Jianyuan Zhai[1], Ilia A. Guzei[1], and Song Jin[1,*]

[1] University of Wisconsin-Madison, USA
[2] Zhejiang University of Technology, China



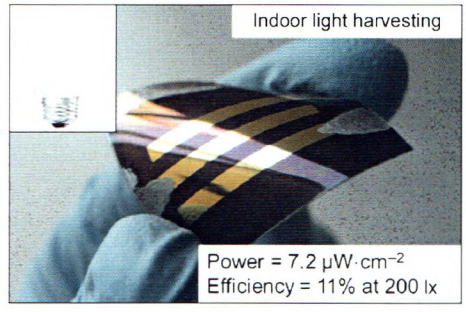
We report the facile solution growth of single-crystal microplates of layered perovskites $(C_6H_5CH_2CH_2NH_3)_2PbX_4$ (X = Br, I) with a well-defined rectangular geometry and nanoscale thickness through a solution-phase transport-growth process and study the growth mechanism. Through halide alloying, the photoluminescence emission with a narrow peak bandwidth is readily tuned from violet to green.

2117–2129

Efficient light harvesting from flexible perovskite solar cells under indoor white light-emitting diode illumination

Giulia Lucarelli[1], Francesco Di Giacomo[1,2], Valerio Zardetto[3], Mariadriana Creatore[3], and Thomas M. Brown[1,*]

[1] University of Rome Tor Vergata, Italy
[2] Holst Centre/TNO - Solliance, the Netherlands
[3] Eindhoven University of Technology, the Netherlands



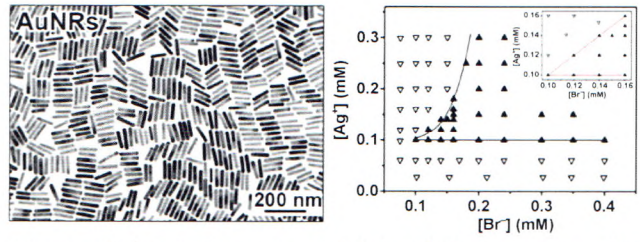
Flexible perovskite solar cells with polyethylene terephthalate (PET)/indium-doped tin oxide (ITO)/atomic layer deposition (ALD)-TiO_2/mesoporous TiO_2 (meso-TiO_2)/$CH_3NH_3PbI_{3-x}Cl_x$/2,2',7,7'-tetrakis-(N,N-di-p-methoxyphenyl amine)9,9'-spirobifluorene (spiro-MeOTAD)/Au architecture, deliver outstanding performance indoors.

2130–2145

Cooperative interactions among CTA^+, Br^- and Ag^+ during seeded growth of gold nanorods

Yong Xu[1], Lei Chen[1], Xingchen Ye[2], Xuchun Wang[1], Jiaqi Yu[1], Yang Zhao[1], Muhan Cao[1], Zhouhui Xia[1], Baoquan Sun[1,*], and Qiao Zhang[1,*]

[1] Soochow University, China
[2] University of California Berkeley, USA



A synergetic interaction among cetyltrimethyl ammonium cation (CTA^+), Br^- and Ag^+ (in the form of CTA-Br-Ag^+ complex) in directing the anisotropic growth of Au NRs has been proposed and confirmed.

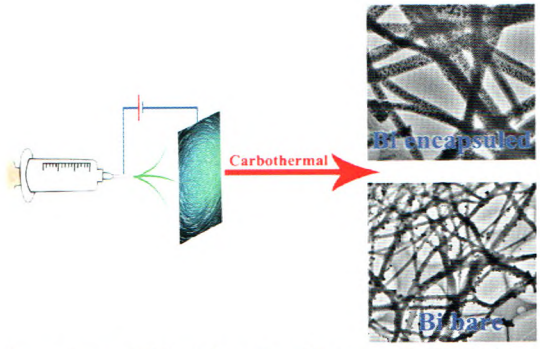
2146–2155

Nanosized-bismuth-embedded 1D carbon nanofibers as high-performance anodes for lithium-ion and sodium-ion batteries

Hong Yin, Qingwei Li, Minglei Cao, Wei Zhang, Han Zhao, Chong Li*, Kaifu Huo, and Mingqiang Zhu*

Huazhong University of Science and Technology, China

2156–2167



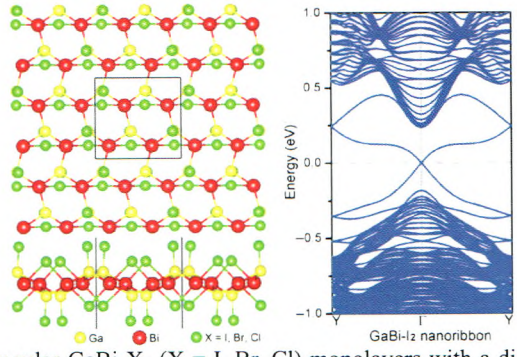
One-dimensional (1D) carbon nanofibers embedded with 20-nm Bi nanoparticles are prepared via a single-nozzle electrospinning method with a specified Bi source followed by carbothermal reduction. The Bi/C nanofibers exhibit superior electrochemistry performance as anode materials for Li- and Na-ion batteries.

Gallium bismuth halide GaBi-X_2 (X = I, Br, Cl) monolayers with distorted hexagonal framework: Novel room-temperature quantum spin Hall insulators

Linyang Li[1,*], Ortwin Leenaerts[1,*], Xiangru Kong[2,*], Xin Chen[3], Mingwen Zhao[3], and François M. Peeters[1,*]

[1] University of Antwerp, Belgium
[2] Peking University, China
[3] Shandong University, China

2168–2180



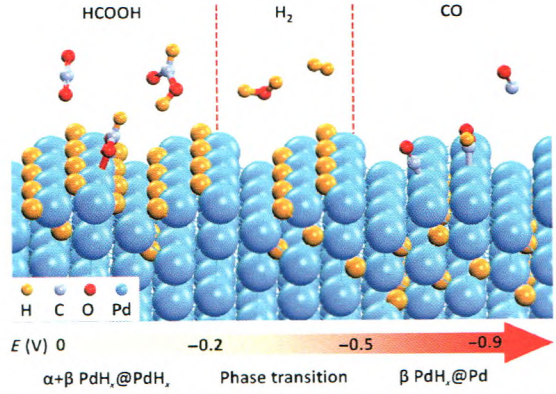
Rectangular GaBi-X_2 (X = I, Br, Cl) monolayers with a distorted hexagonal framework (DHF) and gapless Dirac edge states of the DHF GaBi-I_2 nanoribbon are fabricated.

Switchable CO_2 electroreduction via engineering active phases of Pd nanoparticles

Dunfeng Gao[1], Hu Zhou[2], Fan Cai[1,6], Dongniu Wang[3], Yongfeng Hu[3], Bei Jiang[4], Wen-Bin Cai[4], Xiaoqi Chen[1], Rui Si[5], Fan Yang[1], Shu Miao[1], Jianguo Wang[2,*], Guoxiong Wang[1,*], and Xinhe Bao[1,*]

[1] Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China
[2] Zhejiang University of Technology, China
[3] University of Saskatchewan, Canada
[4] Fudan University, China
[5] Shanghai Institute of Applied Physics, Chinese Academy of Sciences, China
[6] University of Chinese Academy of Sciences, China

2181–2191



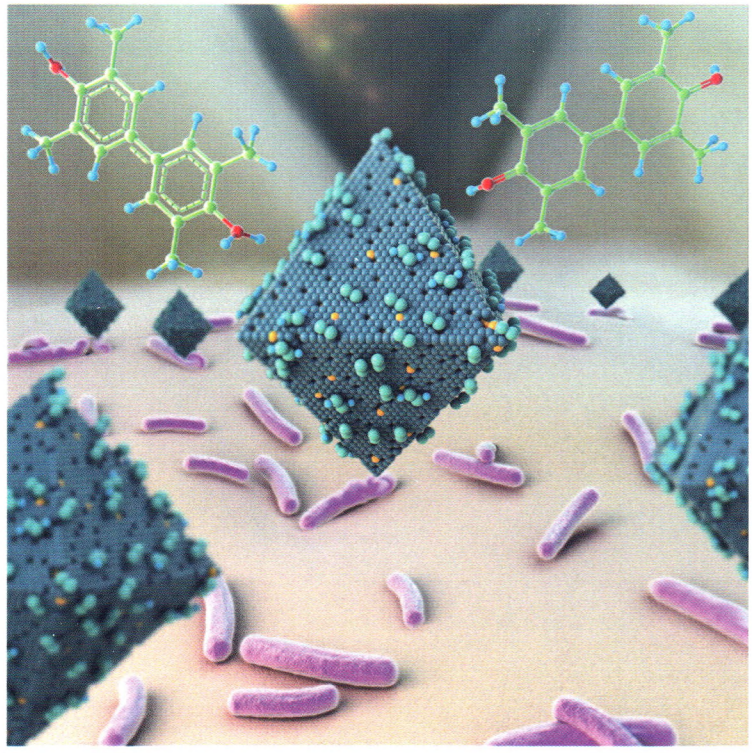
Active-phase transformation of Pd nanoparticles causes drastic selectivity fluctuations of CO_2 electroreduction across the entire potential range.

Erratum to: Magnetic iron oxide nanoparticles accelerate osteogenic differentiation of mesenchymal stem cells via modulation of long noncoding RNA *INZEB2* (DOI 10.1007/s12274-016-1322-4)
2192

ISSN 1998-0124
CN 11-5974/O4

Nano Research

Volume 10 · Number 6 · June 2017
(Monthly, started in 2008)



纳米研究（英文版）（月刊，2008年创刊） 第10卷 第6期 2017年6月出版

Editors-in-Chief	Hongjie Dai, Yadong Li	**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**	戴宏杰　李亚栋
Address	Xueyan Building,	**编　辑**	《纳米研究》编辑部
	Tsinghua University,	**出版发行**	清华大学出版社有限公司
	Beijing 100084, China	**印刷单位**	北京中献拓方科技发展有限公司
Website	www.theNanoResearch.com & www.springer.com/journal/12274		
Online Manuscript Submission, Review and Tracking System	www.editorialmanager.com/nare		

ISSN 1998-0124
9 771998 012177 06>