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Facile grafting strategy synthesis of single-atom electrocatalyst with enhanced ORR performance



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Contents

Review Article

Recent advances in photodynamic therapy based on emerging two-dimensional layered nanomaterials

Xinqiang Wu¹, Xiaofeng Jiang¹, Taojian Fan², Zhiwei Zheng¹,
Zhaoyuan Liu¹, Yubin Chen¹, Liangqi Cao¹, Zhongjian Xie²,
Dawei Zhang¹, Jiaqi Zhao², Qiwen Wang¹, Zhenhui Huang¹,
Zhijian Chen¹, Ping Xue^{1,*}, and Han Zhang^{2,*}

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² Shenzhen University, China

Recent advances in the underlying mechanism of two-dimensional nanomaterials (2DNMs)-photodynamic therapy (PDT), how to enhance tumor-killing efficacy, the preparation methods of 2DNMs and the classical reports of various kinds of 2DNMs were reviewed. With unique electronic structure and exceptional optical properties, 2DNMs are expected to conquer any obstacle in maximizing antitumor efficacy of PDT.

1485–1508

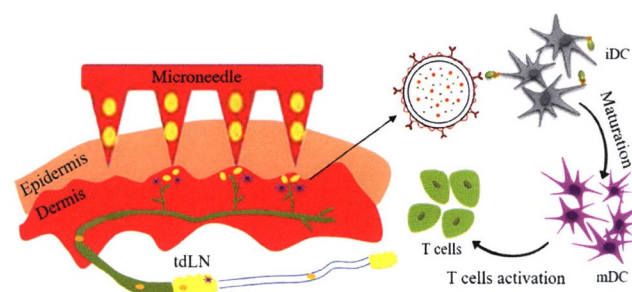
Research Articles

Reverse immune suppressive microenvironment in tumor draining lymph nodes to enhance anti-PD1 immunotherapy via nanovaccine complexed microneedle

Zhongzheng Zhou¹, Jianhui Pang¹, Xuanjin Wu¹, Wei Wu¹,
Xiquang Chen^{1,2}, and Ming Kong^{1,*}

¹ Ocean University of China, China

² Qingdao National Laboratory for Marine Science and Technology, China



Combined therapy with the nanovaccines complexed microneedle and α PD1 through transdermal immunization significantly promoted infiltration of CD8+ T and CD4+ T cells in tDLN and tumor tissues, and reduced regulatory T cells frequency to reverse immunosuppressive microenvironment into immune activation.

1509–1518

Crystal-plane-dependent redox reaction on Cu surfaces

Yangsheng Li^{1,2}, Hao Chen^{1,2}, Weijia Wang³, Wugen Huang^{1,2}, Yanxiao Ning¹, Qingfei Liu^{1,2}, Yi Cui⁴, Yong Han³, Zhi Liu^{3,5}, Fan Yang^{1,3,*}, and Xinhe Bao¹

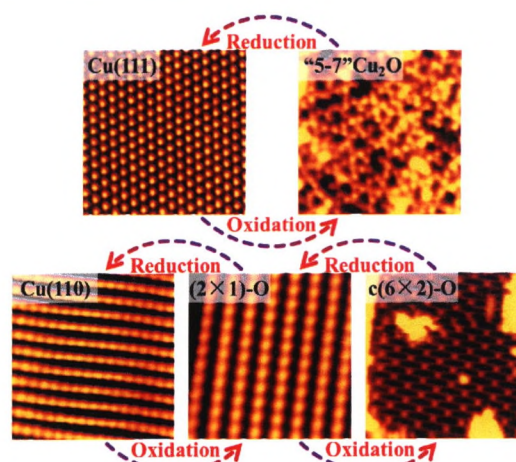
¹ Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China

³ ShanghaiTech University, China

⁴ Suzhou Institute of Nano-Tech and Nano-Bionics, China

⁵ Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China



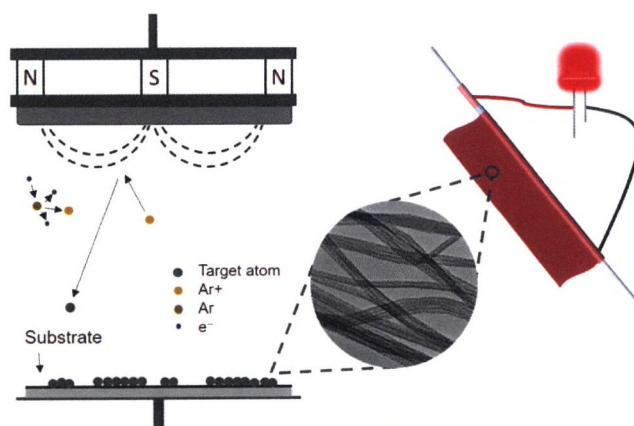
The crystal-plane-dependent oxidation and reduction processes were studied at the atomic scale by *in-situ* scanning tunneling microscopy (STM) on Cu surfaces.

1677–1685

A stretchable, asymmetric, coaxial fiber-shaped supercapacitor for wearable electronics

Hua Yuan, Guang Wang, Yuxing Zhao, Yang Liu, Yang Wu*, and Yuegang Zhang*

Tsinghua University, China



Nanomaterials deposited by magnetron sputtering were utilized for fabricating a stretchable, asymmetric, coaxial fiber-shaped supercapacitor with a high potential window of 1.8 V. The device demonstrated a high energy density of 4.7 mWh·cm⁻³ and superior performance under a strain up to 75%.

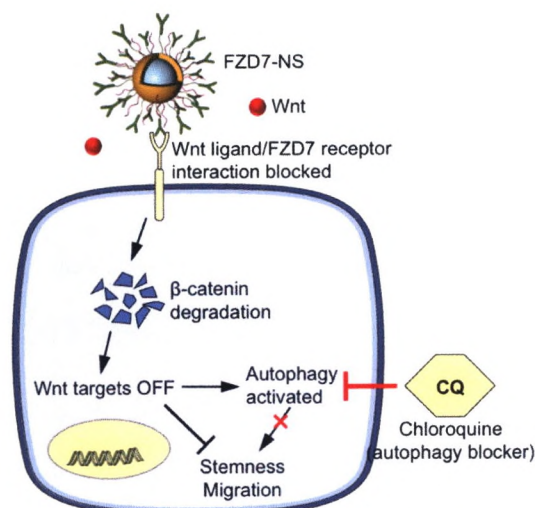
1686–1692

Inhibition of Wnt signaling by Frizzled7 antibody-coated nanoshells sensitizes triple-negative breast cancer cells to the autophagy regulator chloroquine

Jianxin Wang¹, Megan N. Dang¹, and Emily S. Day^{1,2,*}

¹ University of Delaware, USA

² Helen F. Graham Cancer Center & Research Institute, USA



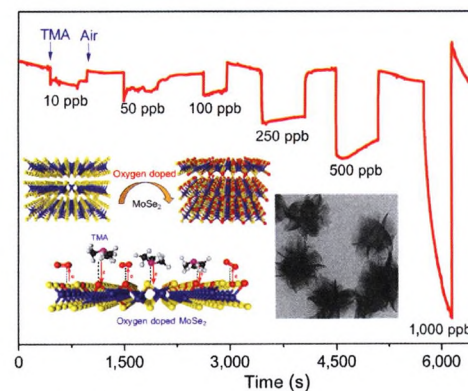
Nanoparticles that suppress Wnt signaling through antibody-mediated signal cascade interference sensitize triple-negative breast cancer cells to the autophagy inhibitor chloroquine.

1693–1703

Fabrication of oxygen-doped MoSe₂ hierarchical nano-sheets for highly sensitive and selective detection of trace trimethylamine at room temperature in air

Nannan Hou, Qianqian Sun, Jing Yang, Su You, Yun Cheng, Qian Xu, Wei Li, Shiqi Xing, Li Zhang, Junfa Zhu, and Qing Yang*

University of Science and Technology of China, China



A novel kind of oxygen-doped MoSe₂ hierarchical nanosheets derived from pristine MoSe₂ ultrathin nanostructures was typically fabricated at 200 °C as treated in air and the nanosheets are capable for fast and sensitive ambient-condition detection of trace trimethylamine (TMA) with a theoretical limit of detection (LOD) of ~ 8 ppb, which is the lowest concentration for TMA detection up to date.

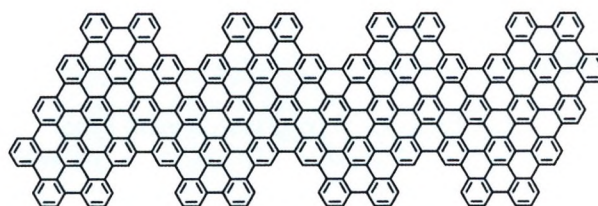
1704–1712

Chevron-type graphene nanoribbons with a reduced energy band gap: Solution synthesis, scanning tunneling microscopy and electrical characterization

Ximeng Liu¹, Gang Li², Alexey Lipatov², Tao Sun¹, Mohammad Mehdi Pour², Narayana R. Aluru¹, Joseph W. Lyding^{1,*}, and Alexander Sinitskii^{2,*}

¹ University of Illinois at Urbana–Champaign, USA

² University of Nebraska–Lincoln, USA



We report a detailed scanning tunneling microscopy characterization of solution-synthesized graphene nanoribbons deposited onto III-V semiconducting InAs(110) substrates. The ribbons were visualized with submolecular resolution, and their measured band gap of about 2 eV was very close to 2.35 eV predicted by the density functional theory (DFT) simulations with GW correction, indicating a weak screening effect of InAs(110) substrate.

1713–1722

Self-organization of various “phase-separated” nanostructures in a single chemical vapor deposition

Jinmei Wang^{1,6}, Dongyue Xie², Zhen Li^{1,†,*}, Xiaohang Zhang³, Xing Sun⁴, Amanda L. Coughlin¹, Thomas Ruch¹, Qiang Chen⁵, Yaroslav Losovyj¹, Seunghun Lee³, Heshan Yu³, Haidong Zhou⁵, Haiyan Wang⁴, Jian Wang², and Shixiong Zhang^{1,7,*}

¹ Indiana University, USA

² University of Nebraska-Lincoln, USA

³ University of Maryland, USA

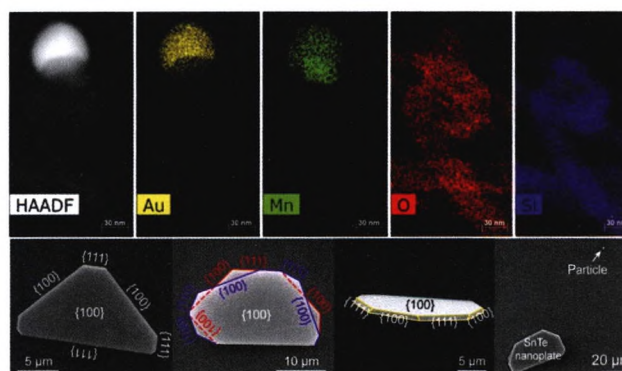
⁴ Purdue University, USA

⁵ University of Tennessee, USA

⁶ Chongqing University of Posts and Telecommunications, China

⁷ Rice University, USA

[†] Present address: RIKEN Center for Advanced Photonics, Japan



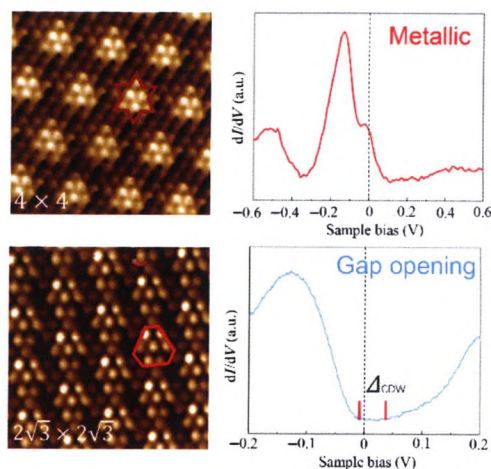
We achieved the self-assembly of phase-separated nanostructures including Si/SiO_x core-shell nanowire heterostructures both with and without embedded manganese silicide particles, Mn₁₁Si₁₉ nanowires, and SnTe nanoplates from a single chemical vapor deposition. The “phase-separation” is well understood based on thermodynamic analysis and density functional theory calculations.

1723–1732

Multimorphism and gap opening of charge-density-wave phases in monolayer VTe₂

Meizhuang Liu, Changwei Wu, Zizhao Liu, Zhiqiang Wang, Dao-Xin Yao*, and Dingyong Zhong*

Sun Yat-sen University, China



The metallic (4×4) phase and the insulating ($2\sqrt{3} \times 2\sqrt{3}$) phase were revealed by scanning tunneling microscopy (STM) and scanning tunneling spectroscopy (STS) study.

1733–1738

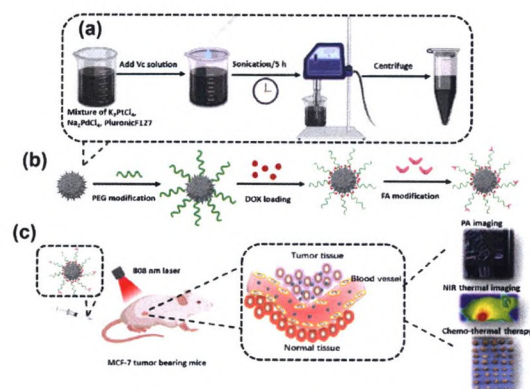
Mesoporous PtPd nanoparticles for ligand-mediated and imaging-guided chemo-photothermal therapy of breast cancer

Yanpeng Jia¹, Yang Song³, Ying Qu¹, Jinrong Peng¹, Kun Shi¹, Dan Du³, He Li^{2,*}, Yuehe Lin^{3,*}, and Zhiyong Qian^{1,*}

¹ Sichuan University and Collaborative Innovation Center, China

² Chengdu University of Information Technology, China

³ Washington State University, USA



A near-infrared (NIR) responsive PtPd-ethylene glycol (PEG)-folic acid (FA)-doxorubicin (DOX) mesoporous nanoparticle was fabricated to achieve active-targeted imaging-guided chemo-photothermal therapy of breast cancer. NIR irradiation could not only induce the hyperthermia to kill tumor cells, but also promote the release of DOX to trigger synergistic therapeutic effect. With high DOX loading capacity, excellent photoacoustic (PA) imaging/photothermal therapy (PTT) effect as well as active targeting function, our nanoplatform is a promising candidate for PTT/chemotherapy in tumor treatment application.

1739–1748

Quality metrology of carbon nanotube thin films and its application for carbon nanotube-based electronics

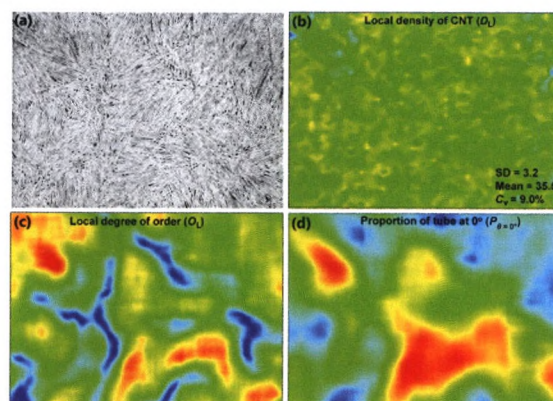
Jie Zhao¹, Lijun Shen^{2,3}, Fang Liu¹, Pan Zhao^{2,4}, Qi Huang¹, Hua Han^{2,3}, Lianmao Peng¹, and Xuelei Liang^{1,*}

¹ Peking University, China

² Institute of Automation, Chinese Academy of Sciences, China

³ University of Chinese Academy of Sciences, China

⁴ Harbin University of Science and Technology, China



Four-parameter metrology: The overall quality of carbon nanotube thin films is thoroughly characterized by a four-parameter metrology, which includes the local tube density (D_L), global density uniformity (C_V), local degree of order (O_L), and the relative tube proportion in a certain orientation (P_θ) at a location. This four-parameter metrology will speed up the development of carbon nanotube-based transistor technology.

1749–1755

Nanoliposome-encapsulated caged-GABA for modulating neural electrophysiological activity with simultaneous detection by microelectrode arrays

Jingyu Xie^{1,2}, Yilin Song^{1,2}, Yuchuan Dai^{1,2}, Ziyue Li^{1,2}, Fei Gao^{1,2}, Xuanyu Li^{2,3}, Guihua Xiao^{1,2}, Yu Zhang^{1,2}, Hao Wang^{1,2}, Zeyang Lu^{1,2}, Xingyu Jiang^{3,4}, Wenfu Zheng³, and Xinxia Cai^{1,2,*}

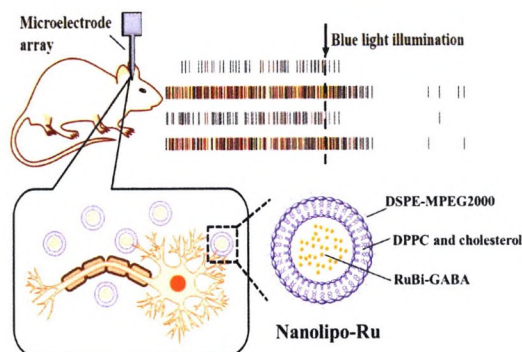
¹ Institute of Electronics, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China

³ National Center for Nanoscience and Technology, China

⁴ Southern University of Science and Technology, China

1756–1763



This article presents a novel and promising strategy to modulate neural signals using RuBi-GABA encapsulated in nanoliposomes (Nanolipo-Ru) with real-time monitoring by the microelectrode array (MEA) in the rat.

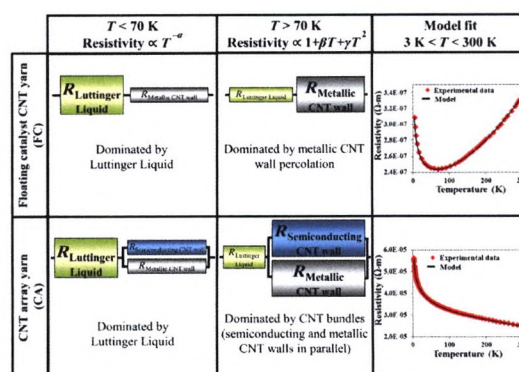
A unified electrical model based on experimental data to describe electrical transport in carbon nanotube-based materials

Yoann Dini¹, Jérôme Faure-Vincent^{2,*}, and Jean Dijon¹

¹ LITEN, France

² CNRS, France

1764–1779



An electrical model was developed to describe the electronic transport in carbon nanotube (CNT)-based materials. Our model successfully fits the literature data and highlights the role played by different mechanisms (Luttinger Liquid, metallic and semiconducting behaviors) depending on the temperature range (3–300 K) and on the fabrication technique (floating catalyst carbon nanotube yarns or carbon nanotube array yarns). It appears that the CNT growth control is much more important than the fabrication technique to allow for high electrical conductivity CNT yarns.

High-performance polarization-sensitive photodetector based on a few-layered PdSe₂ nanosheet

Jiahong Zhong¹, Juan Yu^{1,2}, Lingkai Cao¹, Cheng Zeng¹, Junnan Ding¹, Chunxiao Cong³, Zongwen Liu⁴, and Yanping Liu^{1,5,*}

¹ Central South University, China

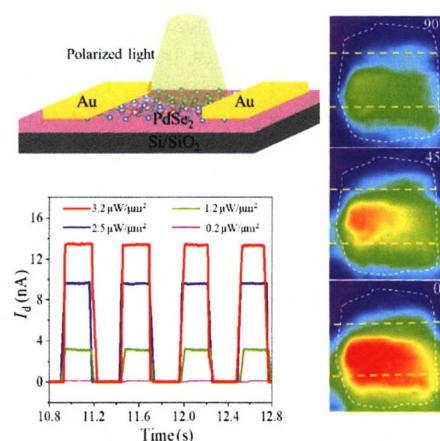
² Hangzhou Dianzi University, China

³ Fudan University, China

⁴ The University of Sydney, Australia

⁵ Shenzhen Research Institute of Central South University, China

1780–1786



The competitive capability to detect polarized light with a significant photocurrent on/off ratio ($> 10^2$), the quite fast response time (< 11 ms) and robust linearly dichroic ratios ($I_{\max}/I_{\min} \approx 1.9$ at 532 nm) was realized in the 5L-PdSe₂-based photodetector.

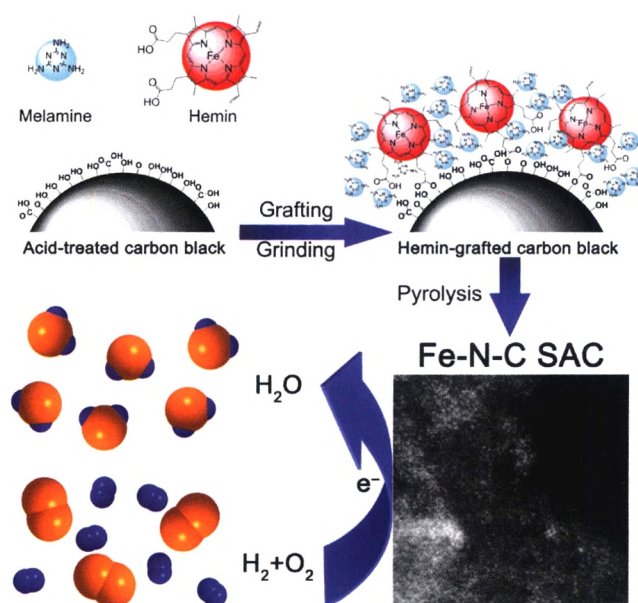
Erratum to: Conformal and continuous deposition of bifunctional cobalt phosphide layers on p-silicon nanowire arrays for improved solar hydrogen evolution (<https://doi.org/10.1007/s12274-018-2070-4>)

1787

Facile grafting strategy synthesis of single-atom electrocatalyst with enhanced ORR performance

Rui Ding, Yide Liu, Zhiyan Rui, Jia Li*, Jianguo Liu*, and Zhigang Zou

Nanjing University, China



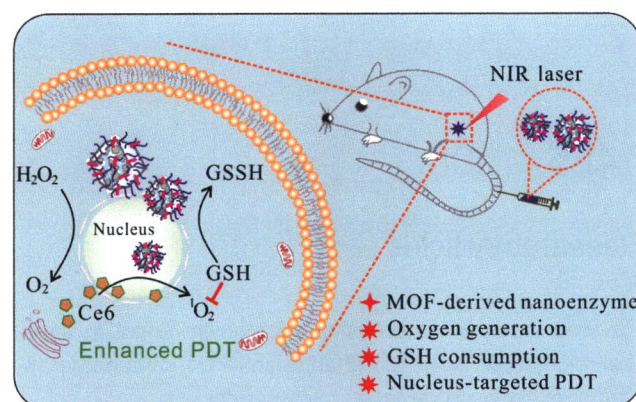
A Fe-N-C single-atom electrocatalyst is synthesized by facile grafting strategy. Chemical bonds between hemin and carbon substrate are achieved by esterification process and melamine which serves as blocking agent and help to suppress aggregation against high temperature during pyrolysis, and thereby directly construct abundant atomically dispersed Fe-N₄ actives with enhanced oxygen reduction reaction (ORR) catalytic performance in acid condition.

1519–1526

Modulation of tumor microenvironment by metal-organic-framework-derived nanoenzyme for enhancing nucleus-targeted photodynamic therapy

Xuemei Zeng, Shuangqian Yan, Peng Chen, Wei Du, and Bi-Feng Liu*

Huazhong University of Science and Technology, China



This work uses metal-organic framework (MOF)-derived nanoenzyme for improving nucleus-targeted photodynamic therapy by modulation of the tumor microenvironment. It may provide a new approach for designing functional nanoenzyme to subcellular organelles-targeted tumor modulation.

1527–1535

Understanding the role of interface in advanced semiconductor nanostructure and its interplay with wave function overlap

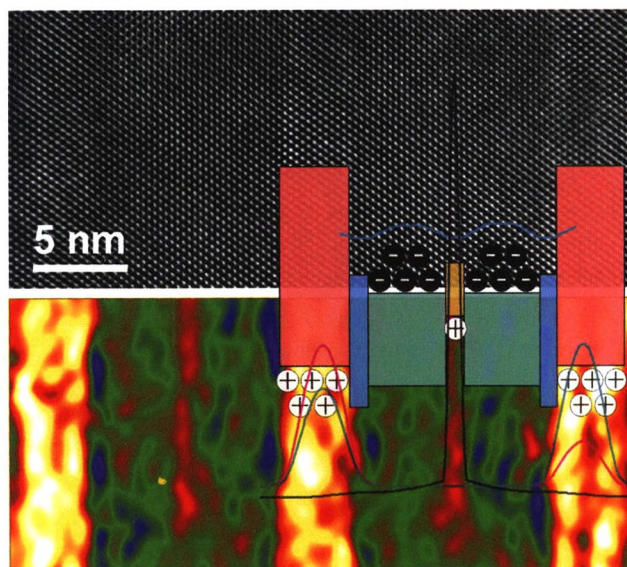
Chenyuan Cai¹, Yunhao Zhao¹, Faran Chang², Xuebing Zhao¹, Liting Yang¹, Chongyun Liang¹, Guowei Wang², Zhichuan Niu², Yi Shi³, Xianhu Liu⁴, Yuesheng Li¹, and Renchao Che^{1,*}

¹ Fudan University, China

² Institute of Semiconductors, Chinese Academy of Sciences, China

³ Nanjing University, China

⁴ Zhengzhou University, China



The effect of interface is explored by comparatively studying two InAs/AlSb superlattices with and without the thin InAsSb layers inserted inside each InAs layers. It has been verified that the addition of InAsSb layers could enhance electron-hole wave function overlap by both theoretical simulations and experimental analysis, which is a premise for better device performance.

1536–1543

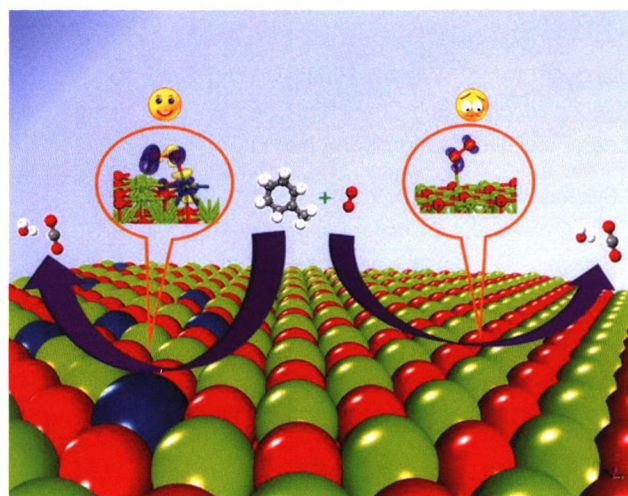
Formation of active oxygen species on single-atom Pt catalyst and promoted catalytic oxidation of toluene

Shunzheng Zhao^{1,2}, Yanfeng Wen¹, Xijun Liu^{3,*}, Xianyun Pen³, Fang Lü³, Fengyu Gao¹, Xizhou Xie¹, Chengcheng Du¹, Honghong Yi^{1,2,*}, Dongjuan Kang^{1,*}, and Xiaolong Tang^{1,2,*}

¹ University of Science and Technology Beijing, China

² Beijing Key Laboratory of Resource-oriented Treatment of Industrial Pollutants, China

³ Tianjin University of Technology, China



Single-atom Pt anchored on MgO nanosheets (Pt SA/MgO) were synthesized for toluene oxidation. It is more favorable for the formation of oxygen vacancies, which facilitate O_2 activation and generation of primary active oxygen species $*O$. With the assistance of H_2O , $*O$ is easier to be dissociated to generate $\cdot OH$ on oxygen vacancies, which is dominant active species for toluene oxidation.

1544–1551

Step-confined thin film growth via near-surface atom migration

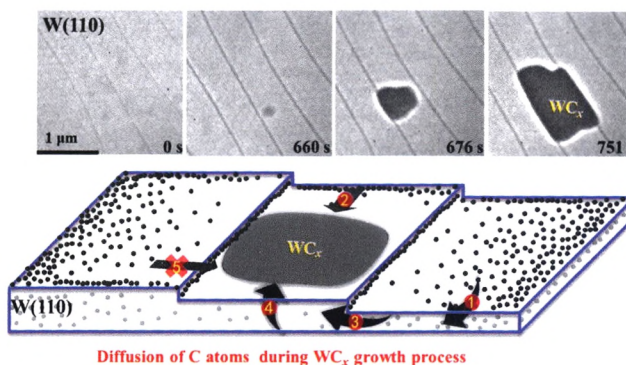
Caixia Meng^{1,2}, Junfeng Gao³, Rongtan Li^{1,2}, Yanxiao Ning¹, Yuan Chang³, Rentao Mu^{1,*}, Qiang Fu^{1,*}, and Xinhe Bao^{1,4}

¹ Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China

³ Dalian University of Technology, China

⁴ University of Science and Technology of China, China



The step-confined growth of WC_x overlayers on W(110) at high temperature (900 °C and above) in C₂H₄ is facilitated by C atom diffusion in the near-surface region and the strong interaction between the surface carbide layer and the W(110) surface.

1552–1557

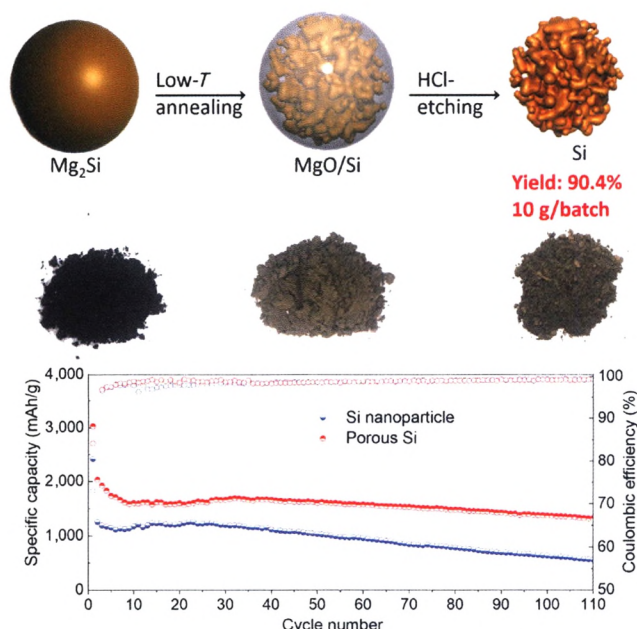
Scalable synthesis of nanoporous silicon microparticles for highly cyclable lithium-ion batteries

Jiangyan Wang¹, William Huang¹, Yong Seok Kim^{1,3}, You Kyeong Jeong¹, Sang Cheol Kim¹, Jeffrey Heo¹, Hiang Kwee Lee¹, Bofei Liu¹, Jaehou Nah³, and Yi Cui^{1,2,*}

¹ Stanford University, USA

² SLAC National Accelerator Laboratory, USA

³ Samsung SDI, Republic of Korea



Nanoporous silicon microparticles with a high yield and production capacity were developed through a scalable, low-cost and HF-free approach. As anode materials for lithium-ion batteries, the nanoporous silicon delivered a much higher reversible capacity and Coulombic efficiency than commercial silicon nanoparticles.

1558–1563

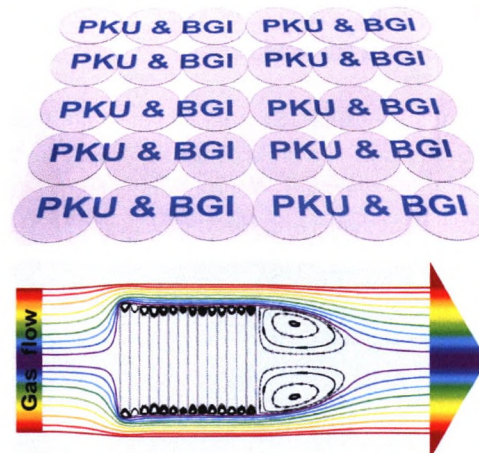
Batch synthesis of transfer-free graphene with wafer-scale uniformity

Bei Jiang¹, Qiyue Zhao¹, Zhepeng Zhang¹, Bingzhi Liu¹, Jingyuan Shan¹, Liang Zhao², Mark H. Rümmeli², Xuan Gao³, Yanfeng Zhang¹, Tongjun Yu¹, Jingyu Sun^{2,3,*}, and Zhongfan Liu^{1,3,*}

¹ Peking University, China

² Soochow University, China

³ Beijing Graphene Institute (BGI), China



Batch synthesis of transfer-free graphene is implemented to show the excellent wafer-scale and batch uniformity. Confined flow field route allows to produce 30 pieces of 4-inch graphene wafers in one batch.

1564–1570

Quantum anomalous Hall effect in two-dimensional Cu-dicyanobenzene coloring-triangle lattice

Yixuan Gao^{1,2}, Yu-Yang Zhang^{1,2,3}, Jia-Tao Sun⁴, Lizhi Zhang^{1,2,*}, Shengbai Zhang⁵, and Shixuan Du^{1,2,3,6,*}

¹ Institute of Physics, Chinese Academy of Sciences, China

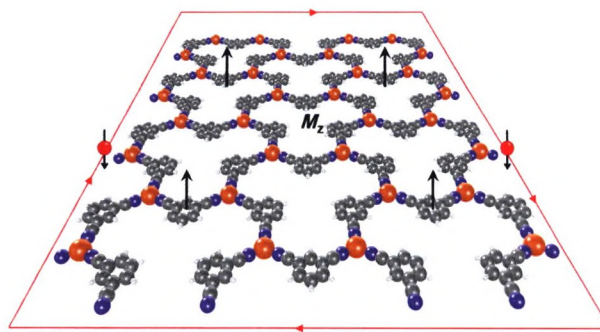
² University of Chinese Academy of Sciences, China

³ CAS Center for Excellence in Topological Quantum Computation, China

⁴ Beijing Institute of Technology, China

⁵ Rensselaer Polytechnic Institute, USA

⁶ Songshan Lake Materials Laboratory, China



Quantum anomalous Hall effect in organometallic lattice

Magnetic two-dimensional topological insulators with spontaneous magnetization have been predicted to host quantum anomalous Hall effects (QAHs). Here, we predict an organometallic coloring-triangle lattice, Cu-dicyanobenzene lattice, to be a stable QAH insulator.

1571–1575

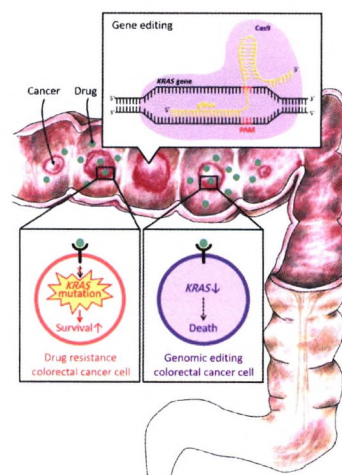
Gene editing particle system as a therapeutic approach for drug-resistant colorectal cancer

Jee-Yeon Ryu¹, You Jung Choi², Eun-Jeong Won¹, Emmanuel Hui³, Ho-Shik Kim², Young-Seok Cho^{2,*}, and Tae-Jong Yoon^{1,*}

¹ Ajou University, Republic of Korea

² The Catholic University of Korea, Republic of Korea

³ Moogene Medi Co., Ltd., Republic of Korea



The Cas9 and single-guide RNA (sgRNA) complex encapsulated nano-liposomal particle as a delivery carrier shows a high therapeutic effect with minimal side effects for the treatment of colorectal tumors using clustered regularly interspaced short palindromic repeat and associated Cas9 nuclease (CRISPR/Cas9) gene editing technology, which has drug resistance due to a *KRAS* gene point mutation.

1576–1585

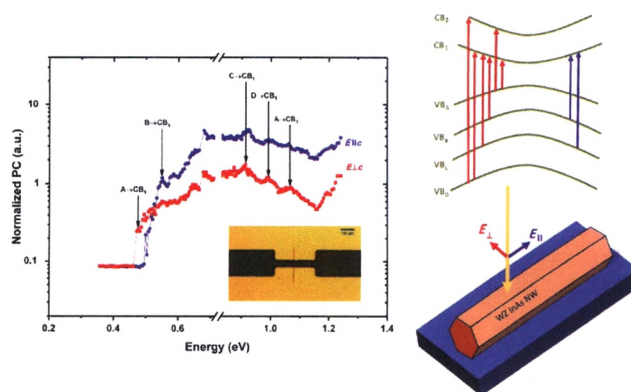
Exploring the band structure of Wurtzite InAs nanowires using photocurrent spectroscopy

Seyyedasadaf Pournia¹, Samuel Linser¹, Giriraj Jnawali¹, Howard E. Jackson¹, Leigh M. Smith^{1,*}, Amira Ameruddin², Philippe Caroff², Jennifer Wong-Leung², Hark Hoe Tan², Chennupati Jagadish², and Hannah J. Joyce³

¹ University of Cincinnati, USA

² The Australian National University, Australia

³ University of Cambridge, UK



This paper uses polarized photocurrent spectroscopy to investigate the band structure of Wurtzite InAs nanowires. Selection rules by group theory enable assignment of peaks which are compared with theoretical calculations.

1586–1591

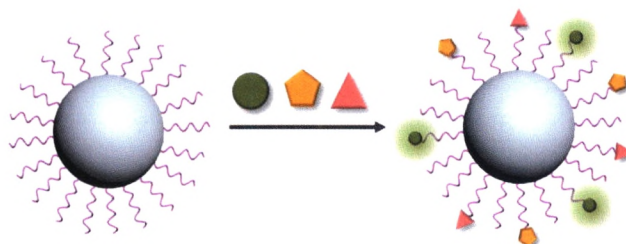
One-step synthesis of amine-coated ultra-small mesoporous silica nanoparticles

Mingyue Cui^{1,2}, Christian Wiraja¹, Lim Wei Qi¹, Sharon Chew Wan Ting¹, Deblin Jana¹, Mengjia Zheng¹, Xiao Hu¹, and Chenjie Xu^{1,2,3,*}

¹ Nanyang Technological University, Singapore

² National Dental Centre of Singapore, Singapore

³ City University of Hong Kong, Hong Kong, China



This report introduces a dual-functionalized (aminated, PEGylated) porous silica nanoparticle system which could be conjugated with different molecules for versatile tracking of bacteria and cancer cells in one step.

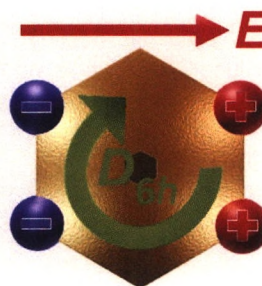
1592–1596

Plasmonics of regular shape particles, a simple group theory approach

Sarra Mitiche[†], Sylvie Marguet, Fabrice Charra, and Ludovic Douillard^{*}

CEA, CNRS, France

[†] Present address: Centrale Supélec, CNRS, France



A simple group theory method is proposed to describe the plasmonic response of particles of finite or infinite symmetry point groups.

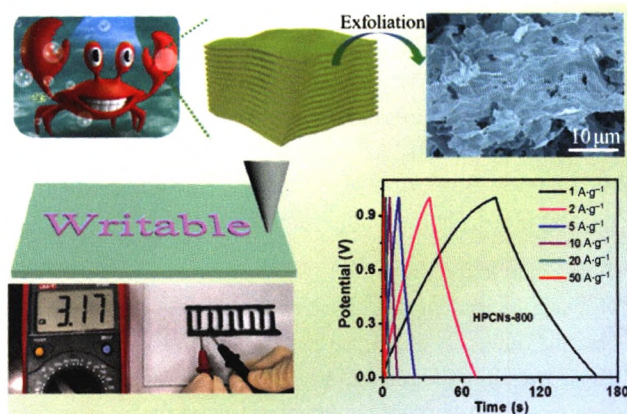
1597–1603

Rationally exfoliating chitin into 2D hierarchical porous carbon nanosheets for high-rate energy storage

Lingfeng Gao¹, Guoqun Zhang², Jie Cai¹, Liang Huang^{2,*}, Jun Zhou², and Lina Zhang^{1,*}

¹ Wuhan University, China

² Huazhong University of Science and Technology, China



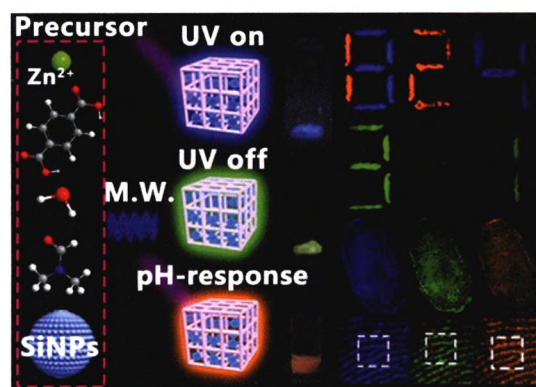
Two-dimensional (2D) hierarchical porous carbon nanosheets with abundant N/O/P doping were massively fabricated via a facile stripping and carbonization method from natural chitin for high-rate energy storage.

1604–1613

Multi-modal anti-counterfeiting and encryption enabled through silicon-based materials featuring pH-responsive fluorescence and room-temperature phosphorescence

Jinhua Wang, Bin Song, Jiali Tang, Guyue Hu, Jingyang Wang, Mingyue Cui, and Yao He*

Soochow University, China



A kind of silicon (Si)-based material, i.e., metal–organic frameworks (MOFs)-encapsulated Si nanoparticles (MOFs@SiNPs), is synthesized through microwave irradiation, which could exhibit pH-responsive fluorescence and room-temperature phosphorescence properties. We further demonstrate the resultant MOFs@SiNPs-based ink could offer multi-modal security, suitable for higher-level information security against counterfeiting.

1614–1619

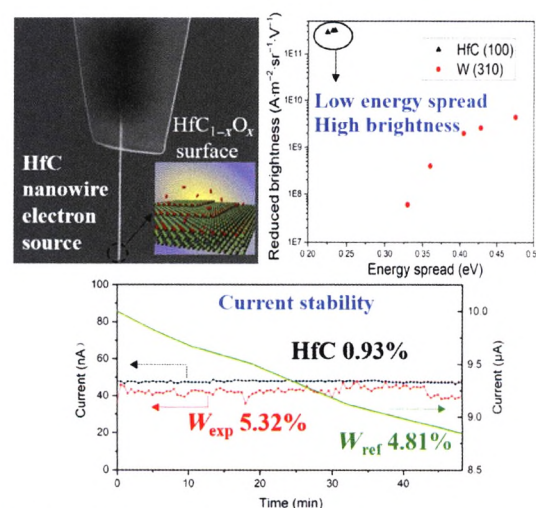
A HfC nanowire point electron source with oxycarbide surface of lower work function for high-brightness and stable field-emission

Shuai Tang¹, Jie Tang^{1,2,*}, Ta-wei Chiu^{1,2}, Wataru Hayami¹, Jun Uzuhashi¹, Tadakatsu Ohkubo¹, Fumihiko Uesugi¹, Masaki Takeguchi¹, Masanori Mitome¹, and Lu-Chang Qin^{3,*}

¹ National Institute for Materials Science, Japan

² University of Tsukuba, Japan

³ University of North Carolina at Chapel Hill, USA



By field evaporation and oxidation pretreatment, a single-crystalline HfC nanowire with an HfC_{1-x}O_x surface layer on its tip apex has been fabricated and characterized as a field-emission point electron source. The new electron source has excellent electron optical properties of long-term current stability, high beam brightness, low energy spread, and lower operational vacuum.

1620–1626

High yield production of ultrathin fibroid semiconducting nanowire of Ta₂Pd₃Se₈

Xue Liu^{1,2}, Sheng Liu², Liubov Yu. Antipina^{3,5,6}, Yibo Zhu⁷, Jinliang Ning¹, Jinyu Liu¹, Chunlei Yue¹, Abin Joshy¹, Yu Zhu⁴, Jianwei Sun¹, Ana M. Sanchez⁸, Pavel B. Sorokin^{3,5}, Zhiqiang Mao¹, Qihua Xiong², and Jiang Wei^{1,*}

¹ Tulane University, USA

² Nanyang Technological University, Singapore

³ National University of Science and Technology "MISIS", Russia

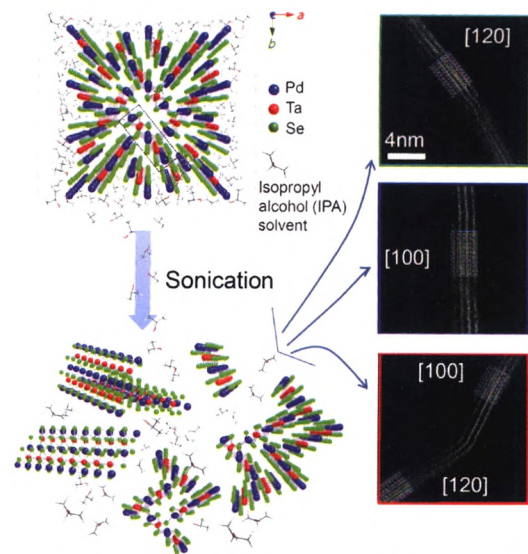
⁴ The University of Akron, USA

⁵ Technological Institute for Superhard and Novel Carbon Materials, Russia

⁶ Moscow Institute of Physics and Technology, Russia

⁷ Columbia University, USA

⁸ University of Warwick, UK



Ultrathin semiconducting Ta₂Pd₃Se₈ nanowires down to a few "unit ribbons" have been produced via liquid phase exfoliation, showing highly preserved crystallinity and stability.

1627–1635

Enhancement of MoTe₂ near-infrared absorption with gold hollow nanorods for photodetection

Jiawen You¹, Ye Yu^{2,†}, Kai Cai^{3,5}, Dongming Zhou⁴, Haiming Zhu⁴, Renyan Wang³, Qingfu Zhang³, Hongwei Liu¹, Yuting Cai¹, Dong Lu⁶, Jang-Kyo KIM¹, Lin Gan^{3,5,*}, Tianyou Zhai^{3,*}, and Zhengtang Luo^{1,*}

¹ The Hong Kong University of Science and Technology, Hong Kong, China

² Leibniz-Institut für Polymerforschung Dresden e. V., Germany

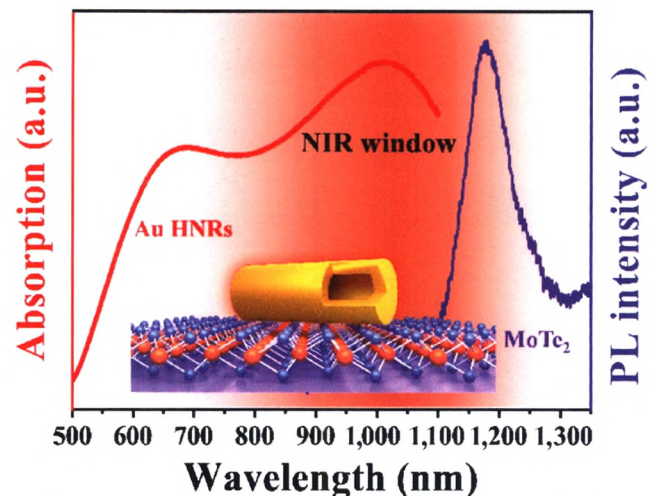
³ Huazhong University of Science and Technology, China

⁴ Zhejiang University, China

⁵ Shenzhen R&D Center of Huazhong University of Science and Technology, China

⁶ Guangzhou HKUST Fok Ying Tung Research Institute, China

[†] Present address: Technische Universität Dresden, Germany



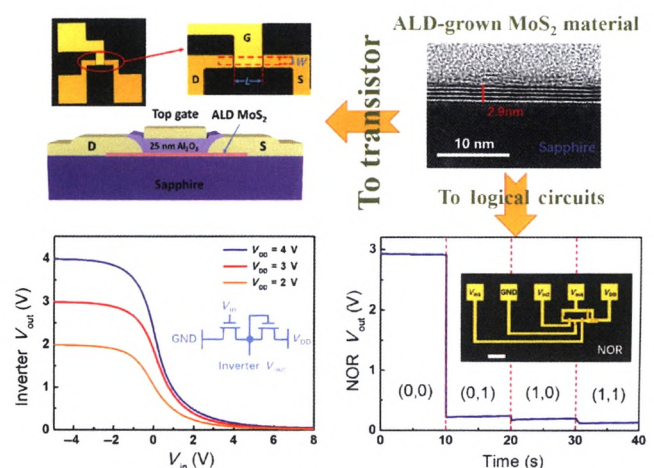
A remarkable enhancement of near-infrared (NIR) response of two-dimensional (2D) materials is achieved by coupling with well-designed gold hollow nanorods.

1636–1643

Atomic layer deposited 2D MoS₂ atomic crystals: From material to circuit

Hao Liu, Lin Chen*, Hao Zhu, Qing-Qing Sun*, Shi-Jin Ding, Peng Zhou, and David Wei Zhang

Fudan University, China



Atomic layer deposition (ALD)-grown MoS₂ material with the application of top-gated transistors and logical circuits is proposed.

1644–1650

C1q recognizes antigen-bound IgG in a curvature-dependent manner

Christina M. Zeuthen^{1,4,5}, Ali Shahrokhtash^{1,5}, Karin Fromell², Kristina Nilsson Ekdahl^{2,3}, Hossein Mohammad-Beigi^{1,5}, and Duncan S. Sutherland^{1,5,*}

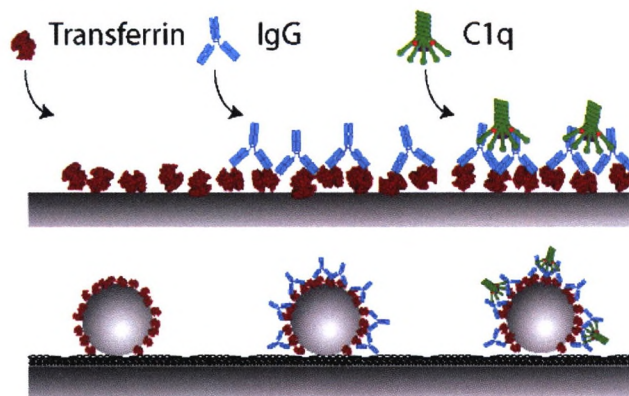
¹ Aarhus University, Denmark

² Uppsala University, Sweden

³ Linnaeus University, Sweden

⁴ Sino-Danish Center for Education and Research, Denmark

⁵ The Centre for Cellular Signal Patterns (CellPAT), Denmark



C1q is an important recognition protein in the complement immune system. In this paper, the curvature-dependence of the interaction between IgG's Fc domain and C1q is shown.

1651–1658

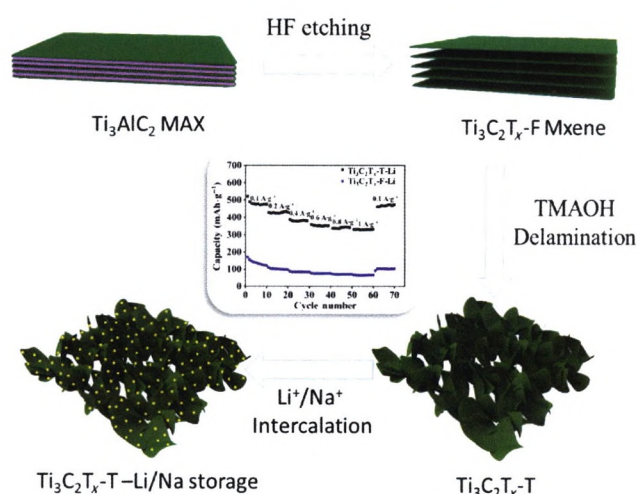
Oligolayered $\text{Ti}_3\text{C}_2\text{T}_x$ MXene towards high performance lithium/sodium storage

Xiaolan Song¹, Hui Wang¹, Shengming Jin¹, Miao Lv¹, Ying Zhang¹, Xiaodong Kong¹, Hongmei Xu¹, Ting Ma¹, Xinyuan Luo¹, Hengfeng Tan¹, Dong Hu¹, Chaoyong Deng², Xinghua Chang^{1,*}, and Jianlong Xu^{3,*}

¹ Central South University, China

² Guangdong Zhiyuan New Material Co., LTD, China

³ Soochow University, China



Oligolayered $\text{Ti}_3\text{C}_2\text{T}_x$ MXene is applied to high performance lithium/sodium storage.

1659–1667

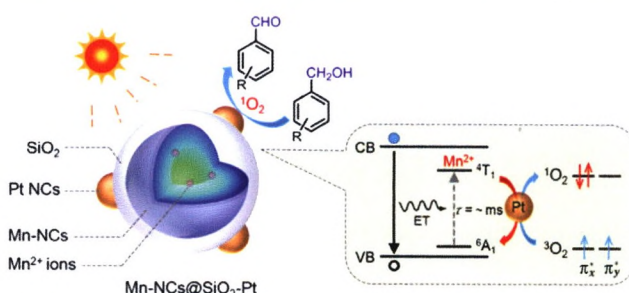
Enhanced singlet oxygen generation by hybrid Mn-doped nanocomposites for selective photo-oxidation of benzylic alcohols

Zhi-Jun Li¹, Shuya Li², Andrew Hunter Davis¹, Elan Hofman¹, Gyu Leem^{2,3}, and Weiwei Zheng^{1,*}

¹ Syracuse University, USA

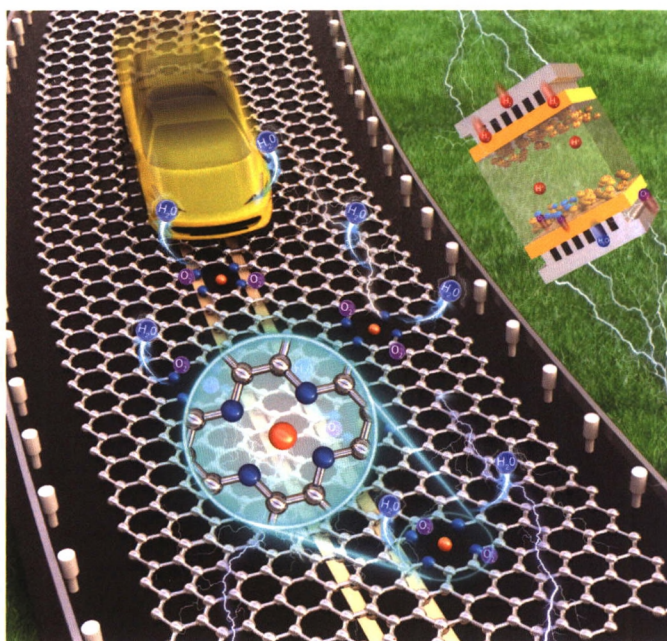
² State University of New York College of Environmental Science and Forestry, USA

³ The Michael M. Szwarc Polymer Research Institute, USA



We report the design of hybrid Mn doped nanocrystals (Mn-NCs)@ SiO_2 -Pt nanocomposites to enhance photocatalytic singlet oxygen ($^1\text{O}_2$) generation via the energy-transfer between Mn-NCs and molecular oxygen ($^3\text{O}_2$). The selective oxidation of primary benzylic alcohols to aldehydes was realized under visible-light irradiation, through an $^1\text{O}_2$ engaged oxidation process with excellent catalytic activity and selectivity.

1668–1676



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