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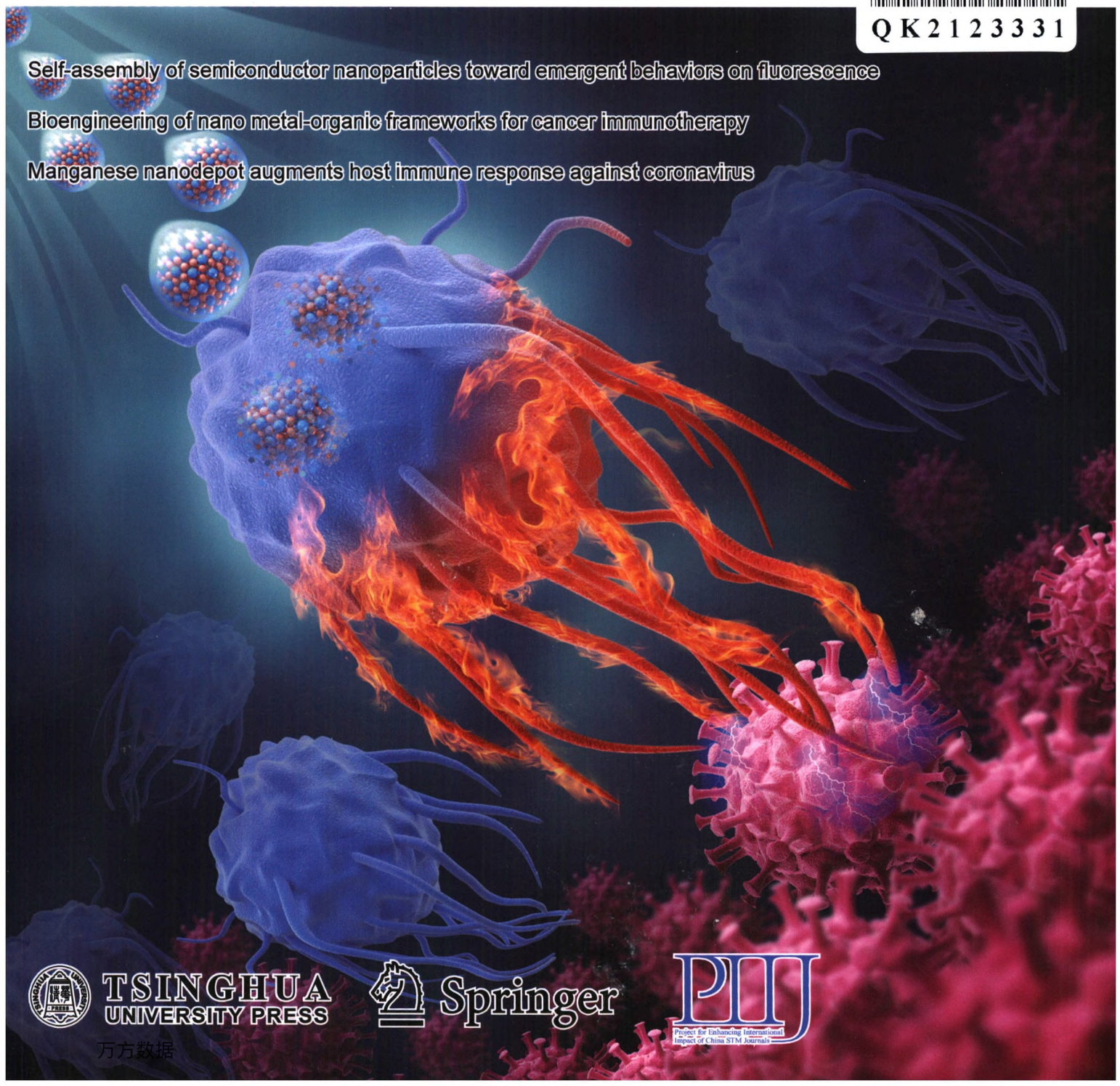


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Self-assembly of semiconductor nanoparticles toward emergent behaviors on fluorescence

Bioengineering of nano metal-organic frameworks for cancer immunotherapy

Manganese nanodepot augments host immune response against coronavirus



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Contents

Flagship Review

Self-assembly of semiconductor nanoparticles toward emergent behaviors on fluorescence

Xiao Li^{1,2}, Zhili Lu³, and Tie Wang^{1,2,4,*}

¹ Institute of Chemistry, Chinese Academy of Sciences, China

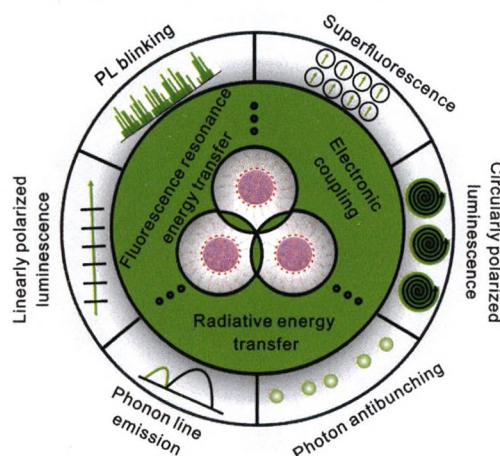
² University of Chinese Academy of Sciences, China

³ Zhengzhou University, China

⁴ Tianjin University of Technology, China

1233–1243

Emergent fluorescence behaviors of assemblies



In this review, we highlight the recent advances in the fluorescence of individual semiconductor nanoparticles, inter-nanoparticles coupling and thus emergent fluorescence behaviors of assemblies. The coupling is the necessary pathway for assemblies beyond individual building blocks to produce emergent fluorescence properties.

Review Article

Bioengineering of nano metal-organic frameworks for cancer immunotherapy

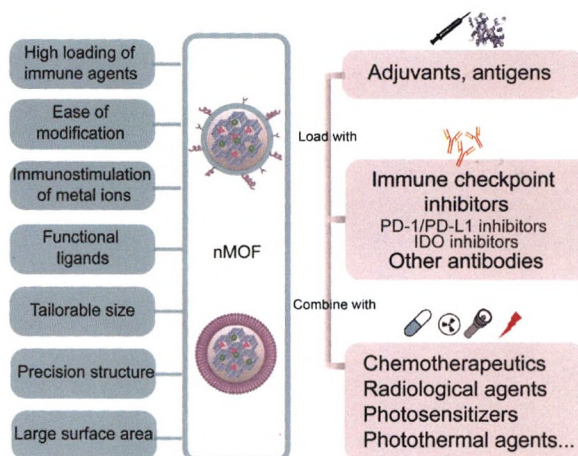
Gaowei Chong¹, Jie Zang¹, Yi Han¹, Runping Su¹, Nopphon Weeranoppanant^{2,3,*}, Haiqing Dong^{1,*}, and Yongyong Li^{1,*}

¹ Tongji University School of Medicine, China

² Burapha University, Thailand

³ Vidyasirimedhi Institute of Science and Technology (VISTEC), Thailand

1244–1259



This manuscript summarizes the most recent works of nano metal-organic frameworks (nMOFs) in immunotherapy, with the emphasis on both vaccine delivery (adjuvants, vaccines) and tumor-microenvironment modulation (immune checkpoint inhibitors, combination therapies). Finally, a prospect of nMOFs in cancer immunotherapy is provided to inspire the ideas to improve effectiveness and safety of cancer immunotherapy.

Research Articles

Manganese nanodepot augments host immune response against coronavirus

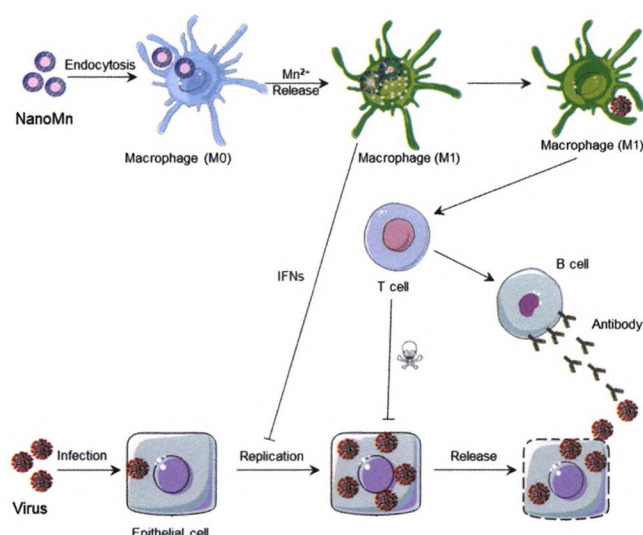
Yizhe Sun¹, Yue Yin¹, Lidong Gong¹, Zichao Liang¹, Chuanda Zhu¹, Caixia Ren¹, Nan Zheng², Qiang Zhang³, Haibin Liu⁴, Wei Liu⁴, Fuping You¹, Dan Lu^{1,*}, and Zhiqiang Lin^{1,*}

¹ Peking University Health Science Center, China

² Peking University Cancer Hospital & Institute, China

³ Peking University, China

⁴ Xinjiang Production and Construction Corps Hospital, China



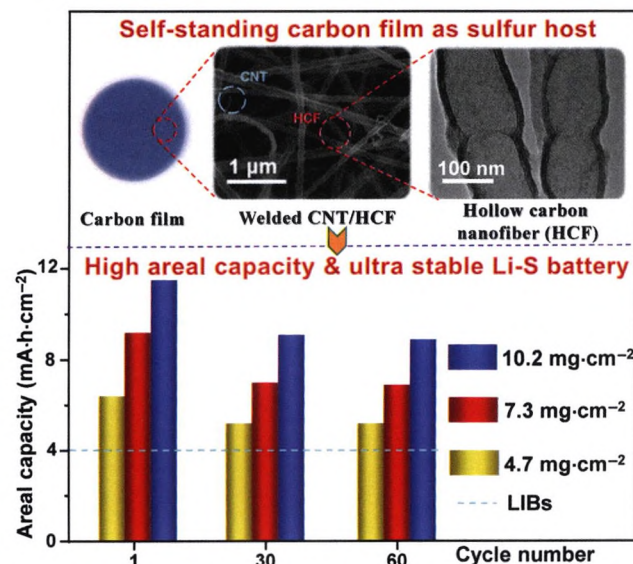
This study demonstrates that the treatment of nanodepot of manganese (nanoMn) augments host antiviral immunity and ameliorates coronavirus-induced tissue damage. The preferential engulfment of nanoMn by macrophages not only limits neuronal accumulation of manganese but also potentiates M1 macrophage polarization, subsequently priming host adaptive immunity against coronavirus. NanoMn offers a safe and robust nanodepot-based strategy against coronavirus.

1260–1272

Multilevel structured carbon film as cathode host for Li-S batteries with superhigh-areal-capacity

Bin He, Wen-Cui Li, Zhi-Yuan Chen, Lei Shi, Yu Zhang, Ji-Li Xia, and An-Hui Lu*

Dalian University of Technology, China



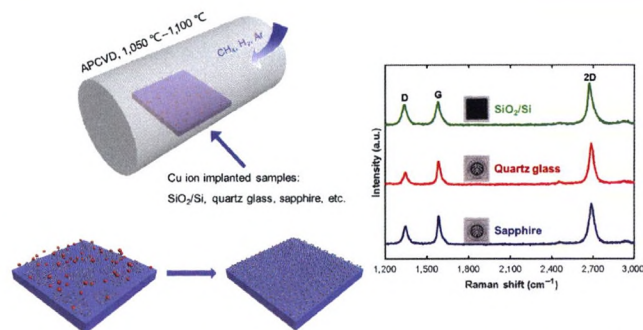
A multilevel structured carbon film is built with well-interweaved conductive network, hollow fibrous structure and abundant N₂O co-doped active sites, which combines the merits of high electronic conductivity (1,200 S·m⁻¹), high porosity and polar characteristic in one host. The obtained sulfur cathode based on the carbon film host shows an ultra-high areal capacity of 8.9 mA·h·cm⁻² at 0.2 C with outstanding cyclability over 60 cycles.

1273–1279

Ion implantation assisted synthesis of graphene on various dielectric substrates

Yunbiao Zhao, Yue li, Yi Chen, Yuhang Chen, Danqing Zhou, and Ziqiang Zhao*

Peking University, China



A Cu ion implantation assisted chemical vapor deposition (CVD) technique was proposed for direct growth of high-quality graphene on various dielectric substrates including SiO_2/Si , quartz glass, and sapphire substrates.

1280–1286

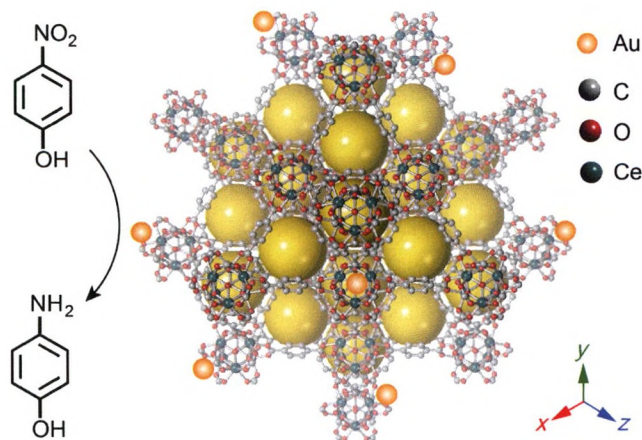
Isolated atomic catalysts encapsulated in MOF for ultrafast water pollutant treatment

Shuailong Guo¹, Hao Yuan¹, Wei Luo¹, Xiaoqing Liu³, Xiantao Zhang¹, Haoqing Jiang^{1,2,*}, Feng Liu^{1,*}, and Gary J. Cheng^{2,*}

¹ Wuhan University, China

² Purdue University, USA

³ Wuhan University of Technology, China



Atomic catalyst encapsulated in MOF

Isolated Au atoms precisely coordinated in defective MOF for highly efficient water pollutant treatment.

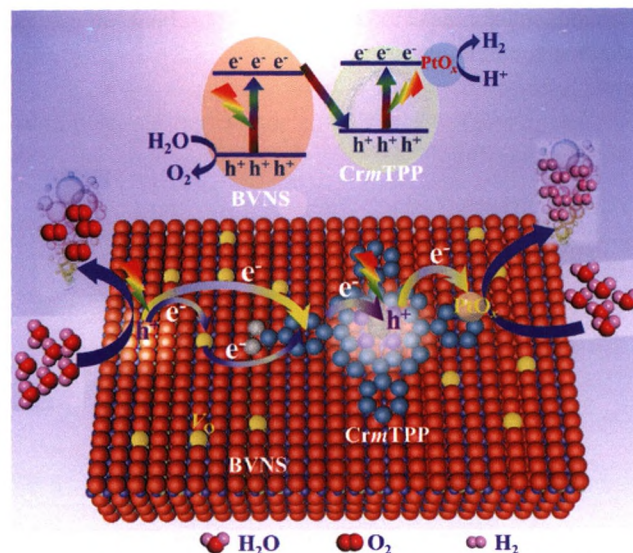
1287–1293

Z-scheme photocatalyst based on porphyrin derivative decorated few-layer BiVO_4 nanosheets for efficient visible-light-driven overall water splitting

Jinming Wang¹, Lulu Guo¹, Lei Xu¹, Peng Zeng^{1,2,*}, Renjie Li^{1,*}, and Tianyou Peng^{1,*}

¹ Wuhan University, China

² Zhaoqing University, China



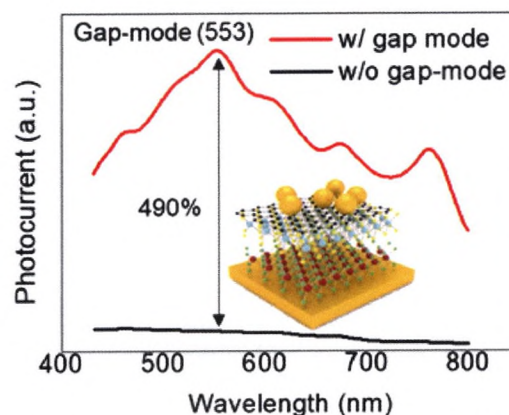
Few-layer BiVO_4 nanosheets decorated with porphyrin derivative are used as a two-step excitation Z-scheme photocatalyst, in which the ultrathin BiVO_4 nanosheets with widely distributed oxygen vacancies enable intimate contact with porphyrin molecules and alleviate the charge recombination, and thus causing robust and durable overall water splitting performance. This two-dimensional (2D) hybrid nanocomposite provides a new approach to the design of highly efficient artificial photosynthetic catalysts.

1294–1304

Atomically thin heterostructure with gap-mode plasmon for overcoming trade-off between photoresponsivity and response time

Khang June Lee, Cheolmin Park, Hyeok Jun Jin, Gwang Hyuk Shin, and Sung-Yool Choi*

Korea Advanced Institute of Science and Technology, Republic of Korea



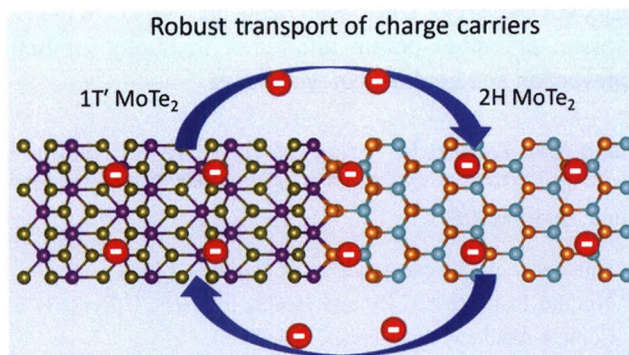
The gap-mode plasmon structure based on a vertically stacked atomically thin p-n junction simultaneously enables high responsivity of up to 8.67 A/W and high operation speed exceeding 35 MHz. The atomically thin two-dimensional (2D) materials act as a spacer for enhancing the gap-mode plasmons, and their short transit length through the vertical direction allows fast transport for photocarriers.

1305–1310

Robust transport of charge carriers in in-plane 1T'-2H MoTe₂ homojunctions with ohmic contact

Donglin Lu, Zhenqing Li, Congsheng Xu, Siwei Luo, Chaoyu He, Jun Li, Gang Guo, Guolin Hao, Xiang Qi*, and Jianxin Zhong*

Xiangtan University, China



The experimental results show that the contact characteristic of in-plane 1T'-2H MoTe₂ homojunction is ohmic contact and exhibits robust carrier transport.

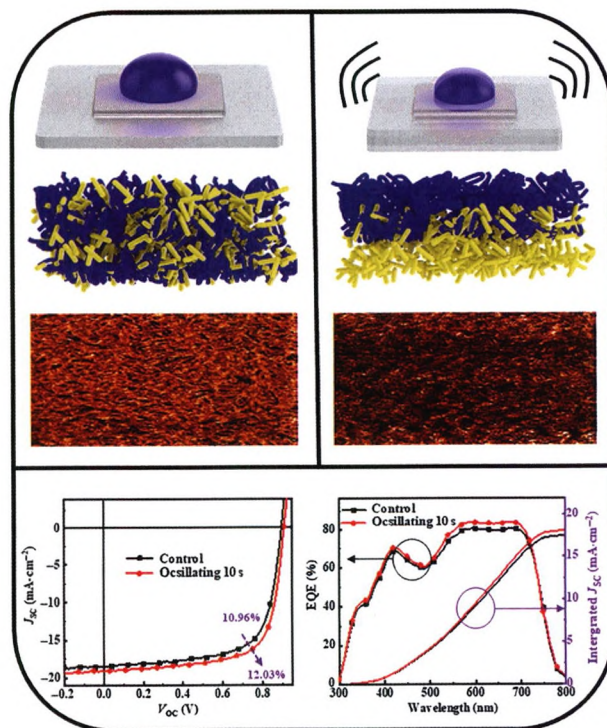
1311–1318

Control of vertical phase separation in high performance non-fullerene organic solar cell by introducing oscillating stratification preprocessing

Dayong Zhang¹, Pu Fan¹, Jinyu Shi¹, Yifan Zheng^{2,*}, Jian Zhong^{1,*}, and Junsheng Yu^{1,*}

¹ University of Electronic Science and Technology of China, China

² Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China



In this work, we develop a simple fabrication process of oscillating stratification preprocessing (OSP), which utilizes the oscillation treatment to regulate the molecular distribution of pending spin-coated solution covered on the substrate. The vertical distribution property will effectively remain from solution state to film state, leading to fabricate an ideal graded vertical phase separation (VPS) bulk-heterojunction (BHJ) of organic solar cells (OSCs), and a remarkable enhancement of power conversion efficiency (PCE) from 10.96% to 12.03%, which can attribute to the simultaneous improvement of J_{SC} , V_{OC} , and fill factor (FF).

1319–1325

Efficient delivery of clay-based nanovaccines to the mouse spleen promotes potent anti-tumor immunity for both prevention and treatment of lymphoma

Ling-Xiao Zhang^{1,3,4,†}, Ying-Bo Jia^{1,4}, Ya-Ru Huang^{1,4}, Hui-Na Liu^{1,2}, Xia-Mei Sun⁴, Ting Cai^{1,2,*}, Rui-Tian Liu^{4,*}, and Zhi Ping Xu^{3,*}

¹ University of Chinese Academy of Sciences, China

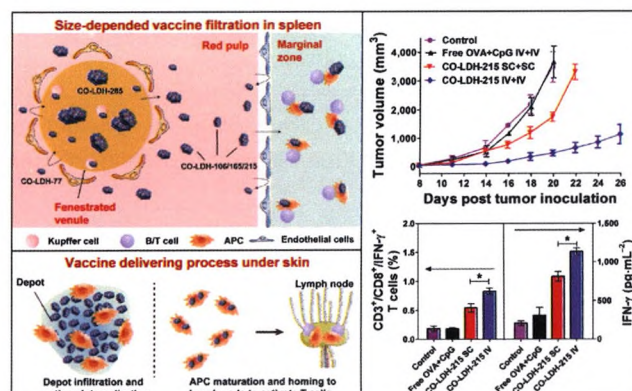
² Ningbo Institute of Life and Health Industry, University of Chinese Academy of Sciences, China

³ The University of Queensland, Australia

⁴ Institute of Process Engineering, Chinese Academy of Sciences, China

[†] Present address: Zhejiang University, China

1326–1334



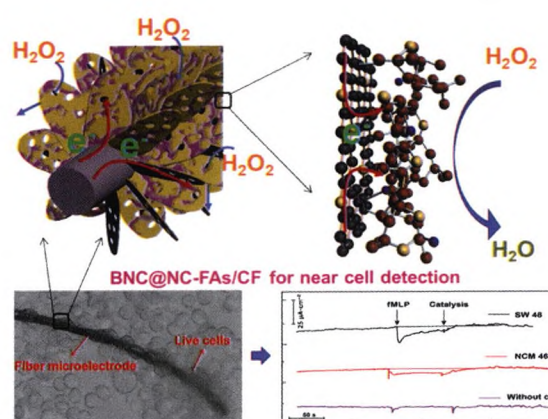
Size-dependent spleen targeted delivery of clay-based cancer therapeutic vaccines more efficiently induces anti-tumor immune responses for both prevention and treatment of lymphoma.

Hierarchical porous carbon heterojunction flake arrays derived from metal organic frameworks and ionic liquid for H₂O₂ electrochemical detection in cancer tissue

Yan Zhang, Qiying Lv, Kai Chi, Qilin Li, Huiling Fan, Bo Cai, Fei Xiao*, Shuai Wang*, Zheng Wang*, and Lin Wang*

Huazhong University of Science and Technology, China

1335–1343



Fabricating three-dimensional (3D) porous B,N-codoped carbon wrapped N-doped graphitic carbon flake arrays heterojunction on flexible carbon fiber substrate for biomolecular detection in cancer tissue.

Is tumor cell specificity distinct from tumor selectivity *in vivo*? A quantitative NIR molecular imaging analysis of nanoliposome targeting

Girgis Obaid^{1,2,†}, Kimberley Samkoe³, Kenneth Tichauer⁴, Shazia Bano¹, Yeonjae Park³, Zachary Silber¹, Sassan Hodge³, Susan Callaghan¹, Mina Guirguis², Srivalleesha Mallidi^{1,†}, Brian Pogue³, and Tayyaba Hasan^{1,5,*}

¹ Massachusetts General Hospital and Harvard Medical School, USA

² University of Texas at Dallas, USA

³ Dartmouth College, USA

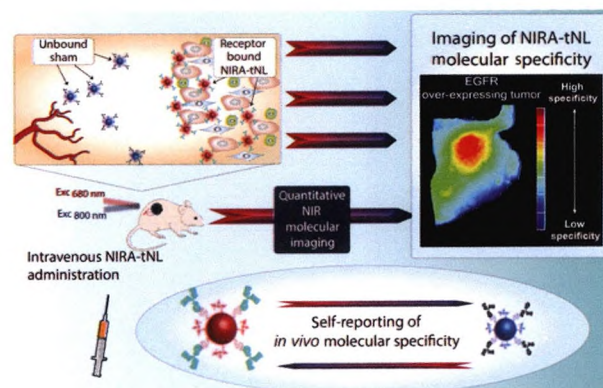
⁴ Illinois Institute of Technology, USA

⁵ Harvard University and Massachusetts Institute of Technology, USA

[†] Present address: University of Texas at Dallas, USA

^{*} Present address: Tufts University, USA

1344–1354



Biomolecular interactions of targeted nanoliposomes (tNLs) with solid tumor receptors *in vivo* are elusive. Here, for the first time, tNLs specific for epidermal growth factor receptor (EGFR) are used with near-infrared (NIR) molecular imaging for non-invasive quantitation of their *in vivo* molecular specificity towards tumor EGFR. We also show that tumor specificity is independent of tumor selective delivery. The purpose of targeting is thus emphasized and tNL development is encouraged, given that the principal goal for targeting is *in vivo* molecular specificity.

Tailoring polysulfide trapping and kinetics by engineering hollow carbon bubble nanoreactors for high-energy Li-S pouch cells

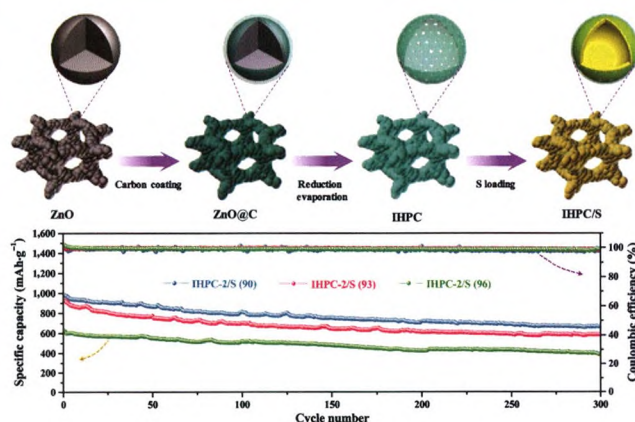
Lei Wang^{1,3}, Shuangke Liu², Jin Hu¹, Xianan Zhang¹, Xin Li¹, Guanhua Zhang^{1,*}, Yujie Li², Chunman Zheng², Xiaobin Hong^{2,*}, and Huigao Duan^{1,*}

¹ Hunan University, China

² National University of Defense Technology, China

³ Foshan University, China

1355–1363



A novel carbon foam integrated by hollow carbon bubble nanoreactors with ultrahigh pore volume and adjustable wall thickness is meticulously designed for high-energy Li-S batteries. When the hollow carbon bubble nanoreactors possess a suitable wall thickness, excellent electrochemical performance can be achieved even with a ultrahigh sulfur content (> 90 wt.%).

An optical slot-antenna-coupled cavity (SAC) framework towards tunable free-space graphene photonic surfaces

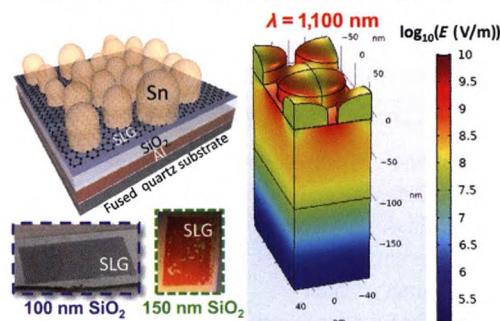
Sidan Fu¹, Xiaoxin Wang¹, Haozhe Wang², Xiaoxue Gao¹, Kurt Broderick², Jing Kong^{2,*}, and Jifeng Liu^{1,*}

¹ Dartmouth College, USA

² Massachusetts Institute of Technology, USA

1364–1373

An optical slot-antenna-coupled cavity (SAC) incorporating single-layer graphene (SLG)



We introduce an optical slot-antenna-coupled cavity (SAC) framework, simultaneously enhancing the absorption of atomically thin single-layer graphene by up to 20× and potentially enabling its electrical gating as a step towards tunable two-dimensional (2D) photonic surfaces. This framework synergistically integrates near-field enhancement induced by ultrahigh refractive index semimetal slot-antenna with broadband cavity resonances in visible and infrared regimes, far exceeding the performance of conventional optical antennas or Fabry-Perot cavities alone.

Atomic Fe-Zn dual-metal sites for high-efficiency pH-universal oxygen reduction catalysis

Jie Xu¹, Shuhua Lai¹, Defeng Qi¹, Min Hu¹, Xianyun Peng¹, Yifan Liu^{2,*}, Wei Liu¹, Guangzhi Hu³, Heng Xu¹, Fan Li¹, Chao Li¹, Jia He^{1,*}, Longchao Zhuo⁴, Jiaqiang Sun⁵, Yuan Qiu¹, Shusheng Zhang⁶, Jun Luo¹, and Xijun Liu^{1,*}

¹ Tianjin University of Technology, China

² Shenzhen University, China

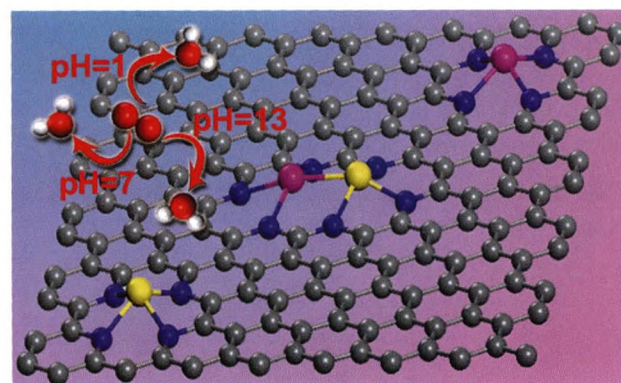
³ Yunnan University, China

⁴ Xi'an University of Technology, China

⁵ Institute of Coal Chemistry, Chinese Academy of Sciences, China

⁶ Zhengzhou University, China

1374–1381



Atomic Fe-Zn pairs anchored on porous N-doped carbons (Fe-Zn-SA/NC) were prepared as efficient oxygen reduction reaction (ORR) catalysts in the whole pH range. It achieves competitive half-wave potentials in 0.1 M HClO₄ (0.78 V), 0.1 M KOH (0.85 V) and 0.1 M phosphate buffer saline (PBS) (0.72 V) solutions, as well as respectable stability. This work demonstrates the great potential of Fe-Zn pairs as a substitute for Pt catalysts towards efficient ORR.

Multi-redox phenazine/non-oxidized graphene/cellulose nano-hybrids as ultrathick cathodes for high-energy organic batteries

Youngjin Ham¹, Vitalii Ri², Jin Kim¹, Yeoheung Yoon³, Jinho Lee¹, Kisuk Kang⁴, Ki-Seok An^{3,*}, Chunjoong Kim^{2,*}, and Seokwoo Jeon^{1,*}

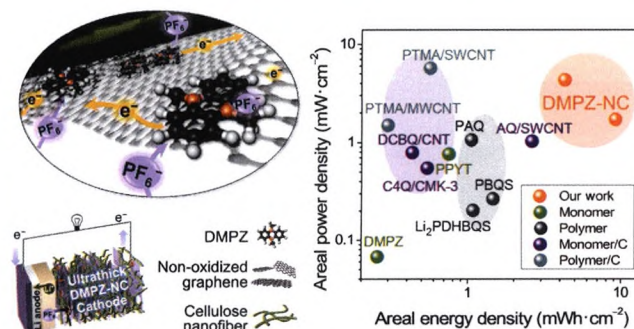
¹ Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea

² Chungnam National University, Republic of Korea

³ Korea Research Institute of Chemical Technology (KRICT), Republic of Korea

⁴ Seoul National University, Republic of Korea

1382–1389



An ultrathick (≈ 1 mm) organic cathode is developed by utilizing the synergetic effect of the non-covalent functionalized graphene flakes and robust cellulose nanofiber-intermingled architecture. Due to the well-developed ion/electron pathways throughout the entire cathode thickness, the multi-redox phenazine-based organic rechargeable batteries exhibit high energy of $9.4 \text{ mWh}\cdot\text{cm}^{-2}$ ($= 864 \text{ Wh}\cdot\text{kg}^{-1}$), as well as enhanced cycling stability.

Shallowing interfacial carrier trap in transition metal dichalcogenide heterostructures with interlayer hybridization

Xu Wu^{1,2}, Jingsi Qiao³, Liwei Liu¹, Yan Shao², Zhongliu Liu², Linfei Li², Zhili Zhu², Cong Wang³, Zhixin Hu⁴, Wei Ji^{3,*}, Yeliang Wang^{1,2,5,*}, and Hongjun Gao^{2,5}

¹ Beijing Institute of Technology, China

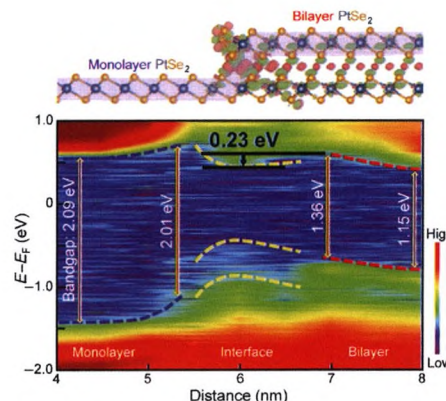
² Institute of Physics & University of Chinese Academy of Sciences, Chinese Academy of Sciences, China

³ Renmin University of China, China

⁴ Tianjin University, China

⁵ CAS Center for Excellence in Topological Quantum Computation, China

1390–1396



In this study, we propose a technique to suppress such carrier trap that uses enhanced interlayer hybridization to saturate dangling-bond states, as demonstrated in a strongly interlayer-coupled monolayer-bilayer PtSe_2 heterostructure. The hybridization between the unsaturated states and the interlayer electronic states of PtSe_2 significantly reduces the depth of carrier traps at the interface, as corroborated by our scanning tunnelling spectroscopic measurements and density functional theory calculations.

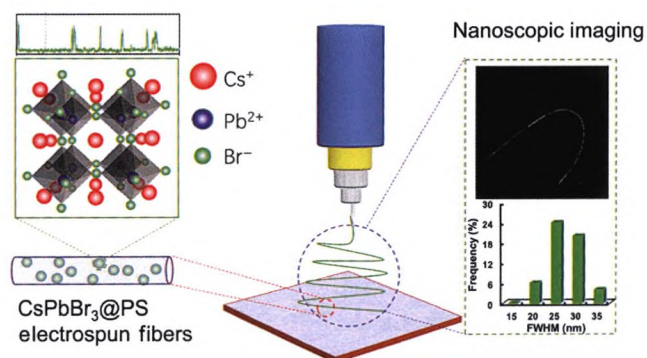
Blinking CsPbBr_3 perovskite nanocrystals for the nanoscopic imaging of electrospun nanofibers

Tianyu Chen¹, Mengna Huang², Zhongju Ye¹, Jianhao Hua¹, Shen Lin^{1,*}, Lin Wei^{2,*}, and Lehui Xiao^{1,*}

¹ Nankai University, China

² Hunan Normal University, China

1397–1404



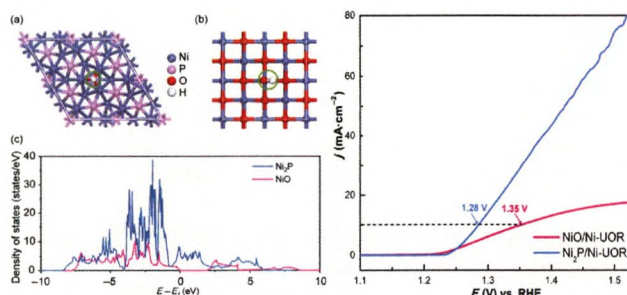
The stochastic optical reconstruction microscopy is successfully employed to visualize the fine structure and morphology of CsPbBr_3 @polystyrene (PS) electrospun fibers at sub-diffraction limit.

Porous rod-like $\text{Ni}_2\text{P}/\text{Ni}$ assemblies for enhanced urea electrooxidation

Qing Li¹, Xinran Li¹, Jiawei Gu¹, Yanle Li², Ziqi Tian^{2,*}, and Huan Pang^{1,*}

¹ Yangzhou University, China

² Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China



The porous rod-like $\text{Ni}_2\text{P}/\text{Ni}$ composite exhibits remarkable enhanced urea oxidation reaction (UOR) activities compared to NiO/Ni , owing to the selective phosphating strategy, high electrocatalytic activity, and excellent cycle stability. The strategy of fabricating metal phosphides-metal assemblies offers an idea for further development of excellent electrocatalysts.

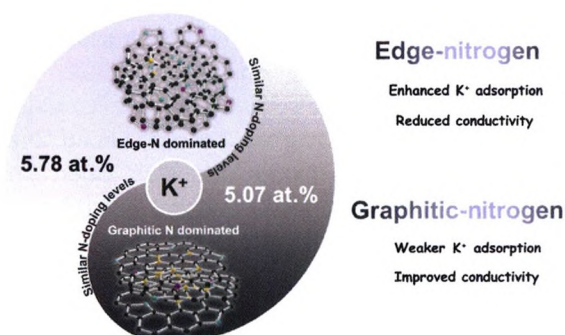
1405–1412

Precise synthesis of N-doped graphitic carbon via chemical vapor deposition to unravel the dopant functions on potassium storage toward practical K-ion batteries

Yu Zhao¹, Zhongti Sun¹, Yuyang Yi¹, Chen Lu¹, Menglei Wang¹, Zhou Xia¹, Xueyu Lian¹, Zhongfan Liu^{1,2,*}, and Jingyu Sun^{1,*}

¹ Soochow University, China

² Peking University, China



Every coin has two sides: The effects of nitrogen dopants with different configurations in carbon on K-ion storage are revisited under similar nitrogen doping levels to guide future design of anodes. Edge-N provides enhanced ion adsorption, contributing to higher capacity but mostly at the high voltage (vs. K^+/K) range. Graphitic-N endows carbon network with improved conductivity but harvest weaker adsorption of K-ions, even inferior to that of bare graphitic carbons.

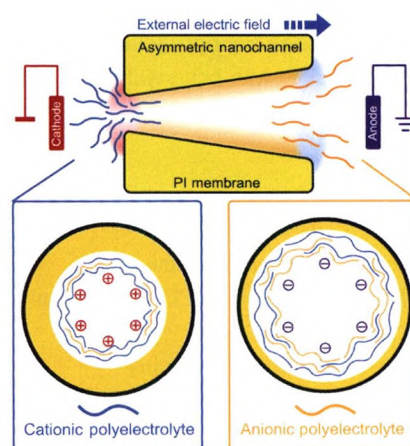
1413–1420

A universal functionalization strategy for biomimetic nanochannel via external electric field assisted non-covalent interaction

Yunfei Teng^{1,2}, Xiang-Yu Kong^{1,*}, Pei Liu^{1,2}, Yongchao Qian¹, Yuhao Hu¹, Lin Fu^{1,2}, Weiwen Xin^{1,2}, Lei Jiang^{1,2}, and Liping Wen^{1,2,*}

¹ Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China

² University of Chinese Academy of Sciences, China



Biomimetic nanochannels gain various responsive abilities from multifarious modification. Based on external electric-field assisted non-covalent interaction, a novel universal modifying strategy is capable to further expand application scenarios of solid-state nanochannels by significant improvements in the convenience and the compatibilities.

1421–1428

Anti-vapor-penetration and condensate microdrop self-transport of superhydrophobic oblique nanowire surface under high subcooling

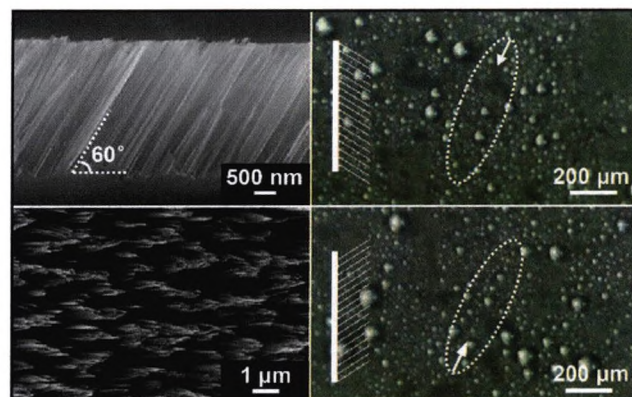
Rui Wang¹, Feifei Wu¹, Fanfei Yu¹, Jie Zhu¹, Xuefeng Gao^{1,2,*}, and Lei Jiang³

¹ Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China

² University of Science and Technology of China, China

³ Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China

1429–1434



Oblique nanowires own anti-vapor-penetration and microdrop self-transport functions under high subcooling, unaffected by microscale gaps, which originates from the co-operation of vapor molecule interception, low solid-liquid adhesion and driving force from asymmetric surface tension and coalescence-released surface energy. This new design idea helps develop more advanced mass and heat transfer interfaces.

Porous γ -Fe₂O₃ nanoparticle decorated with atomically dispersed platinum: Study on atomic site structural change and gas sensor activity evolution

Qiheng Li¹, Zhi Li^{1,*}, Qinghua Zhang², Lirong Zheng³, Wensheng Yan⁴, Xiao Liang¹, Lin Gu², Chen Chen¹, Dingsheng Wang¹, Qing Peng¹, and Yadong Li^{1,*}

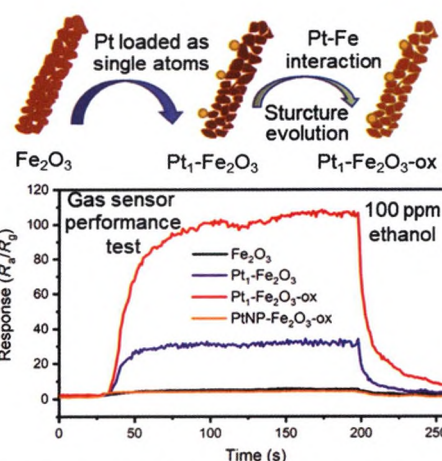
¹ Tsinghua University, China

² University of Chinese Academy of Sciences, China

³ Institute of High Energy Physics, Chinese Academy of Sciences, China

⁴ University of Science and Technology of China, China

1435–1442



In this paper, we reported a Pt single atom doped γ -Fe₂O₃ nanoparticles as effective ethanol gas sensor material. The function of doped Pt single atoms and the structure–performance relationship were studied in detail.

Highly selective electrocatalytic Cl[−] oxidation reaction by oxygen-modified cobalt nanoparticles immobilized carbon nanofibers for coupling with brine water remediation and H₂ production

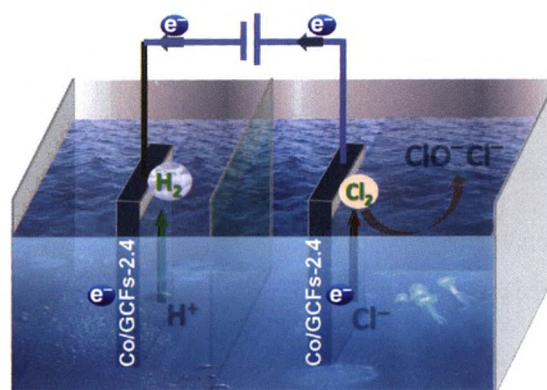
Qizhong Xiong¹, Xian Zhang^{2,*}, Qipeng Cheng¹, Guoqiang Liu³, Gang Xu¹, Junli Li¹, Xinxin Ye^{1,*}, and Hongjian Gao¹

¹ Anhui Agricultural University, China

² Institute of Solid State Physics, Chinese Academy of Sciences, China

³ Hefei University of Technology, China

1443–1449



Seawater electrolysis

By a two-step method of adsorption and pyrolysis reduction, an ultrafine Co nanoparticles anchored graphitic carbon nanofibers catalyst is designed, which exhibits excellent electrocatalytic hydrogen evolution reaction (HER) and selective Cl[−] oxidation reaction (COR) performance.

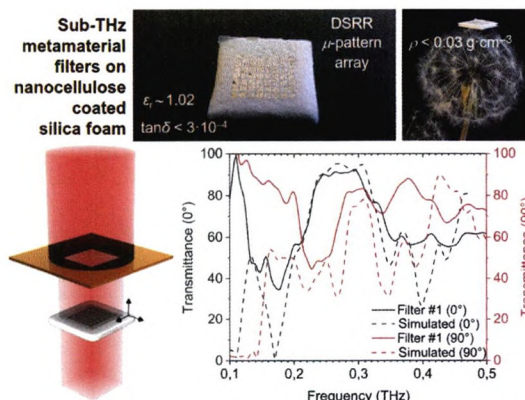
Lightweight porous silica foams with extreme-low dielectric permittivity and loss for future 6G wireless communication technologies

Petra S. Pálvölgyi¹, Daniel Sebők², Imre Szenti², Eva Bozó¹, Henri Ervasti¹, Olli Pitkänen¹, Jari Hannu¹, Heli Jantunen¹, Marko E. Leinonen¹, Sami Myllymäki¹, Akos Kukovecz^{2,*}, and Krisztian Kordas^{1,*}

¹ University of Oulu, Finland

² University of Szeged, Hungary

1450–1456



Dielectric substrates of extreme-low permittivity and loss-factor based on ultra-high porosity silica foams coated with cellulose nano-fiber thin films are proposed. By sputter deposition of Ag through a shadow mask on the surfaces, dual split-ring resonator arrays are made to demonstrate filters for future 6G telecommunication in the sub-THz band.

Theory-guided construction of electron-deficient sites via removal of lattice oxygen for the boosted electrocatalytic synthesis of ammonia

Li Zhang¹, Shilong Jiao², Xin Tan³, Yuliang Yuan¹, Yu Xiang⁴, Yu-Jia Zeng², Jingyi Qiu^{4,*}, Ping Peng^{1,*}, Sean C. Smith³, and Hongwen Huang^{1,*}

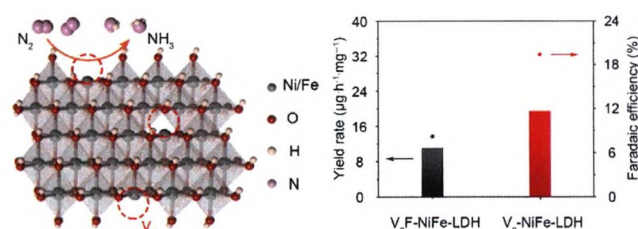
¹ Hunan University, China

² Shenzhen University, China

³ The Australian National University, Australia

⁴ Research Institute of Chemical Defense, China

1457–1464



A catalyst with high density of electron-deficient sites was fabricated, which exhibited the outstanding electrocatalytic performance towards nitrogen reduction reaction (NRR).

Fabrication of metal-organic framework-based nanofibrous separator via one-pot electrospinning strategy

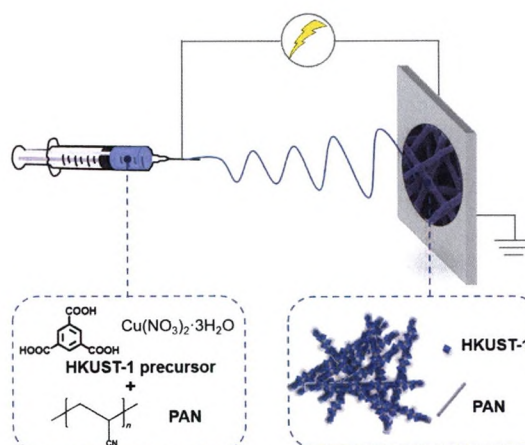
Congcong Chen¹, Weidong Zhang¹, He Zhu^{1,2,*}, Bo-Geng Li¹, Yingying Lu², and Shiping Zhu^{2,3,*}

¹ Zhejiang University, China

² The Chinese University of Hong Kong, China

³ McMaster University, Canada

1465–1470



A straightforward method has been developed to fabricate metal-organic framework (MOF)/polymer nanofibrous membranes via electrospinning stock solution consisting of MOF precursors and polymer. The obtained HKUST-1/PAN electrospun membranes having uniform MOF dispersions and strong mechanical properties were applied as the separators in Li-metal full batteries, which exhibited greatly improved the cycling performance.

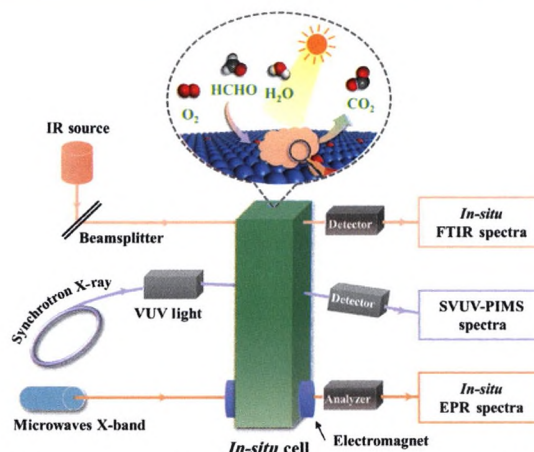
Probing reaction pathways for H₂O-mediated HCHO photooxidation at room temperature

Weiwei Shao^{1,2}, Xiaodong Li^{1,2}, Xiaolong Zu^{1,2}, Liang Liang^{1,2}, Yang Pan^{1,2}, Junfa Zhu^{1,2}, Chengming Wang^{1,2}, Yongfu Sun^{1,2,*}, and Yi Xie^{1,2,*}

¹ University of Science and Technology of China, China

² Hefei Comprehensive National Science Center, China

1471–1478



To achieve a thorough comprehending of the underlying formaldehyde photooxidation mechanism, especially the exact role of H₂O molecules, we designed two-dimensional ultrathin sheets as ideal models to clearly unveil the mechanism of H₂O-mediated formaldehyde photooxidation at the atomic level, by virtue of time-resolved *in-situ* characterization technology.

g-C₃N₄ encapsulated ZrO₂ nanofibrous membrane decorated with CdS quantum dots: A hierarchically structured, self-supported electrocatalyst toward synergistic NH₃ synthesis

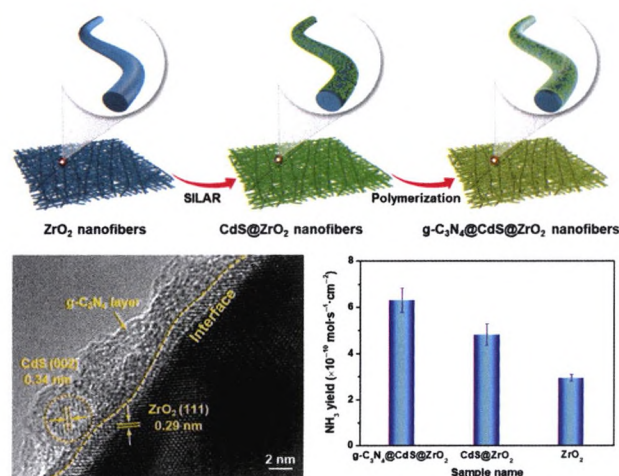
Jun Song^{1,2}, Jin Dai¹, Peng Zhang³, Yitao Liu^{1,*}, Jianyong Yu¹, and Bin Ding^{1,*}

¹ Donghua University, China

² Yancheng Institute of Technology, China

³ Zhengzhou University, China

1479–1487



A hierarchically structured, self-supported electrocatalyst, consisting of g-C₃N₄ encapsulated ZrO₂ nanofibrous membrane decorated with CdS QDs, is fabricated, which exhibits a remarkable synergy toward NH₃ synthesis.

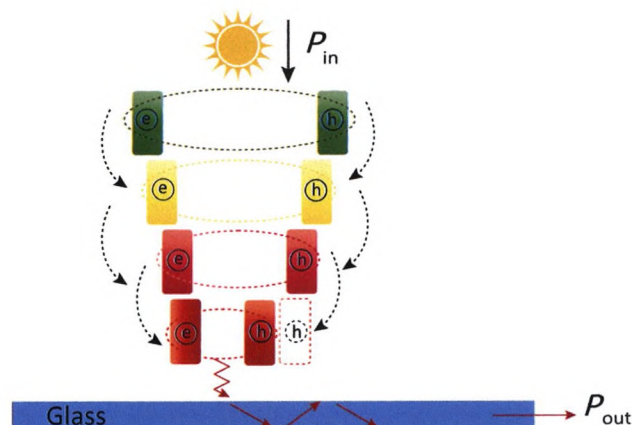
Exciton recycling via InP quantum dot funnels for luminescent solar concentrators

Houman Bahmani Jalali¹, Sadra Sadeghi¹, Isinsu Baylam¹, Mertcan Han¹, Cleva W. Ow-Yang², Alphan Sennaroglu¹, and Sedat Nizamoglu^{1,*}

¹ Koç University, Turkey

³ Sabanci University, Turkey

1488–1494



Engineering at nanoassembly level combined with nonradiative energy transfer and exciton recycling offers promise for efficient solar energy harvesting.

From intrinsic dielectric loss to geometry patterns: Dual-principles strategy for ultrabroad band microwave absorption

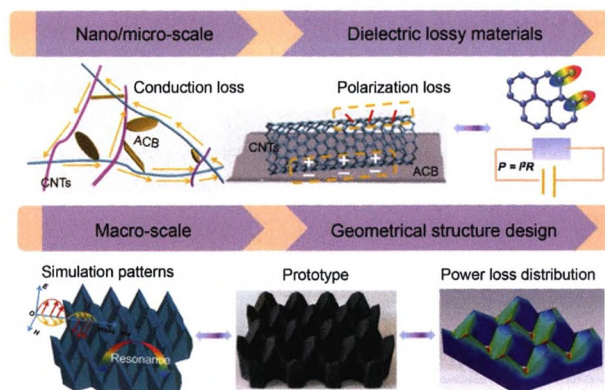
Bin Quan^{1,2}, Weihua Gu¹, Jiaqi Sheng¹, Xinfeng Lv³, Yuyi Mao³, Lie Liu⁴, Xiaogu Huang^{2,*}, Zongjun Tian^{1,*}, and Guangbin Ji^{1,*}

¹ Nanjing University of Aeronautics and Astronautics, China

² Nanjing University of Information Science & Technology, China

³ National Center of Supervision and Inspection on Additive Manufacturing Products Quality, China

⁴ Shenzhen General Test Systems Inc, China



A dual-principle strategy, namely, the combination of microscopic dielectric loss and macroscopic geometry-induced loss was proposed to achieve the broad effective absorption bandwidth and resonance response range.

1495–1501

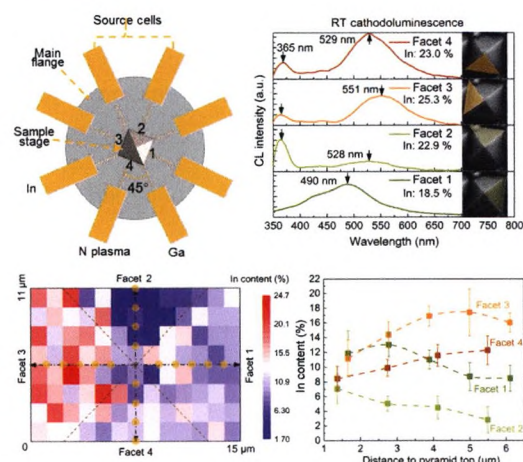
Inter-facet composition modulation of III-nitride nanowires over pyramid textured Si substrates by stationary molecular beam epitaxy

Peng Wang^{1,2,*}, Hedong Chen¹, Hao Wang², Dan Wang¹, Changkun Song¹, Xingyu Wang¹, Hongjie Yin¹, Lujia Rao¹, Guofu Zhou^{1,3,*}, and Richard Nötzel^{1,3,*}

¹ South China Normal University, China

² Xiamen University, China

³ Academy of Shenzhen Guohua Optoelectronics, China



InGaN nanowires (NWs) are grown on pyramid textured Si substrates by stationary plasma-assisted molecular beam epitaxy (PA-MBE) with inter-facet modulation of the composition and topography. The inter-facet cross talk is investigated in details with the adatom immigration across the ridge facet boundary identified as the dominating factor.

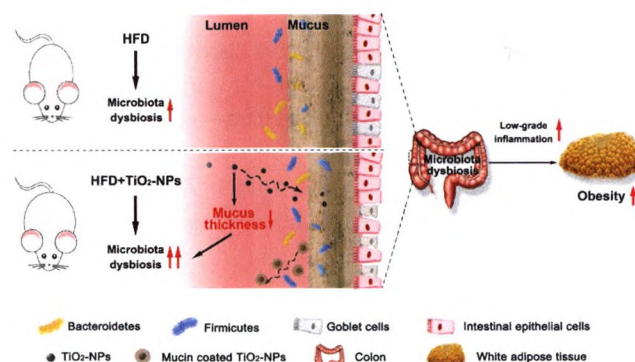
1502–1511

Long-term exposure to titanium dioxide nanoparticles promotes diet-induced obesity through exacerbating intestinal mucus layer damage and microbiota dysbiosis

Xiaoqiang Zhu¹, Lijun Zhao¹, Zhi Liu¹, Qibing Zhou¹, Yanhong Zhu^{1,*}, Yuliang Zhao^{2,*}, and Xiangliang Yang^{1,*}

¹ Huazhong University of Science and Technology, China

² National Center for Nanoscience and Technology of China, China



Long-term oral exposure to titanium dioxide nanoparticles (TiO₂-NPs) increases gut permeability through mucus layer damage and induces microbiota dysbiosis, which together result in low-grade systemic inflammation, thus aggravating high fat diet (HFD)-induced obesity.

1512–1522

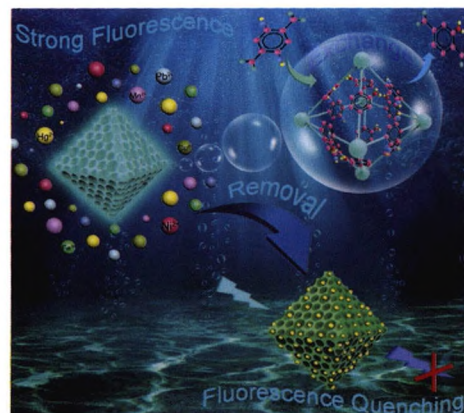
Rational design of smart adsorbent equipped with a sensitive indicator via ligand exchange: A hierarchical porous mixed-ligand MOF for simultaneous removal and detection of Hg^{2+}

Liang Zhang¹, Jing Wang¹, Huiting Wang¹, Wentao Zhang¹, Wenxin Zhu¹, Ting Du¹, Yongsheng Ni¹, Xianghong Xie¹, Jing Sun², and Jianlong Wang^{1,*}

¹ Northwest A&F University, China

² Northwest Institute of Plateau Biology, Chinese Academy of Sciences, China

1523–1532



Guided by the optimized solvent-assisted ligand exchange (SALE) approach, this work rationally constructed a novel bifunctional NSU66 adsorbent to achieve the sensitive detection and efficient removal of Hg^{2+} with satisfactory selectivity and strong anti-interference ability. The delicate design of mixed-ligand and hierarchical-pore structure of NSU66 bestows its significantly enhanced Hg^{2+} sensing and trapping capabilities.

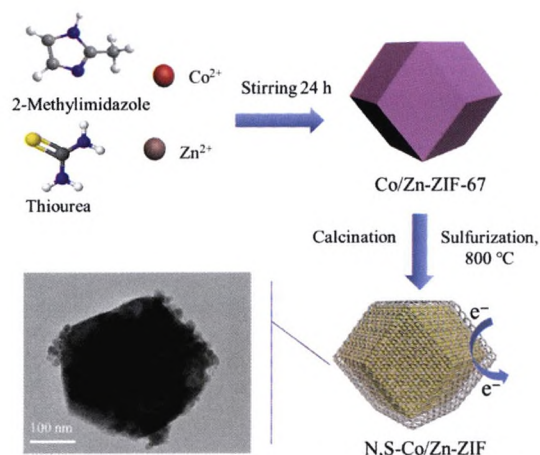
Bimetallic metal-organic framework derived doped carbon nanostructures as high-performance electrocatalyst towards oxygen reactions

Lu Chen¹, Zhi Chen^{1,*}, Xudong Liu¹, and Xiaolei Wang^{1,2,*}

¹ Concordia University, Canada

² University of Alberta, Canada

1533–1540



Bifunctional electrocatalyst with unique porous and doped carbon nanostructure is designed and derived from bimetallic cobalt and zinc containing metal-organic frameworks exhibiting outstanding electrocatalytic performance in both oxygen reduction and evolution reactions towards metal-air battery applications.

A dual-functional poly(vinyl alcohol)/poly(lithium acrylate) composite nanofiber separator for ionic shielding of polysulfides enables high-rate and ultra-stable Li-S batteries

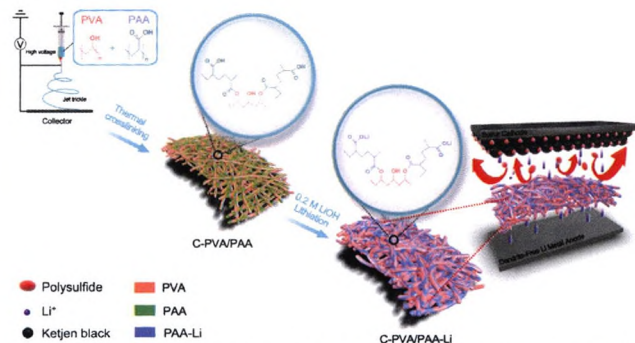
Chunyang Zhou¹, Jing Wang³, Xiaobo Zhu¹, Kai Chen¹, Yue Ouyang¹, Yue Wu¹, Yue-E Miao^{1,*}, and Tianxi Liu^{1,2}

¹ Donghua University, China

² Jiangnan University, China

³ University of Bristol, UK

1541–1550



A bifunctional poly(vinyl alcohol)/poly(lithium acrylate) composite nanofiber separator with well-developed porous structure and high ionic conductivity was developed to simultaneously inhibit the shuttle of polysulfides and growth of lithium dendrites in lithium-sulfur battery applications.

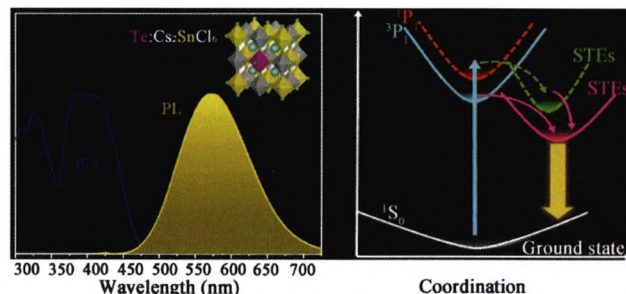
Boosting triplet self-trapped exciton emission in Te(IV)-doped Cs₂SnCl₆ perovskite variants

Ruosheng Zeng^{1,2}, Kun Bai², Qilin Wei¹, Tong Chang¹, Jun Yan¹, Bao Ke¹, Jialuo Huang¹, Liushun Wang³, Weichang Zhou^{3,*}, Sheng Cao¹, Jialong Zhao^{1,*}, and Bingsuo Zou^{1,*}

¹ Guangxi University, China

² Guilin University of Electronic Technology, China

³ Hunan Normal University, China



Triplet Te(IV) ion $^3P_1 \rightarrow ^1S_0$ recombination induced intense green-yellow self-trapped exciton emission in Te:Cs₂SnCl₆ perovskite variants.

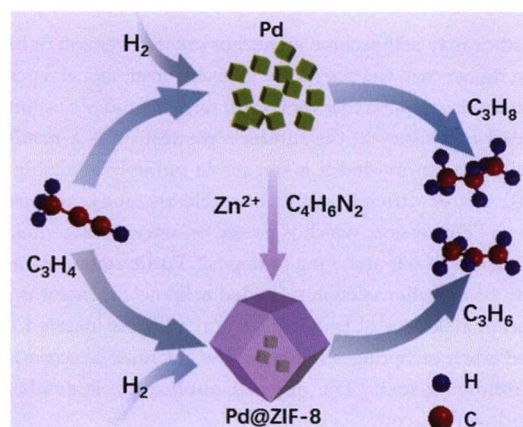
1551–1558

Regulation of surface carbides on palladium nanocubes with zeolitic imidazolate frameworks for propyne selective hydrogenation

Linzhong Wu^{1,2}, Mingyu Chu¹, Jin Gong¹, Muhan Cao^{1,*}, Yu Liu¹, and Yong Xu^{1,2,*}

¹ Soochow University, China

² Guangdong University of Technology, China



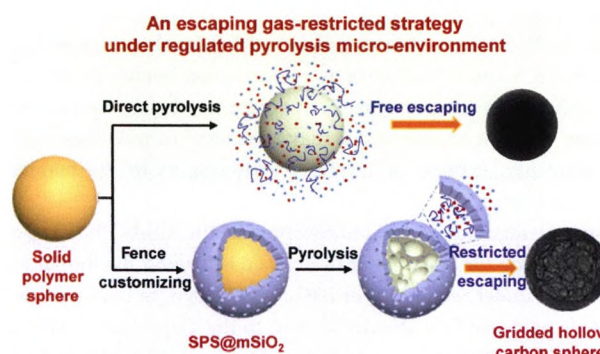
Zeolitic imidazolate framework (ZIF-8) can be used as an efficient support for regulating the palladium carbides on the surface of Pd nanocubes (NCs). As a result, the composites can serve as highly active and selective catalysts for propyne selective hydrogenation.

1559–1564

Sculpturing solid polymer spheres into internal gridded hollow carbon spheres under controlled pyrolysis micro-environment

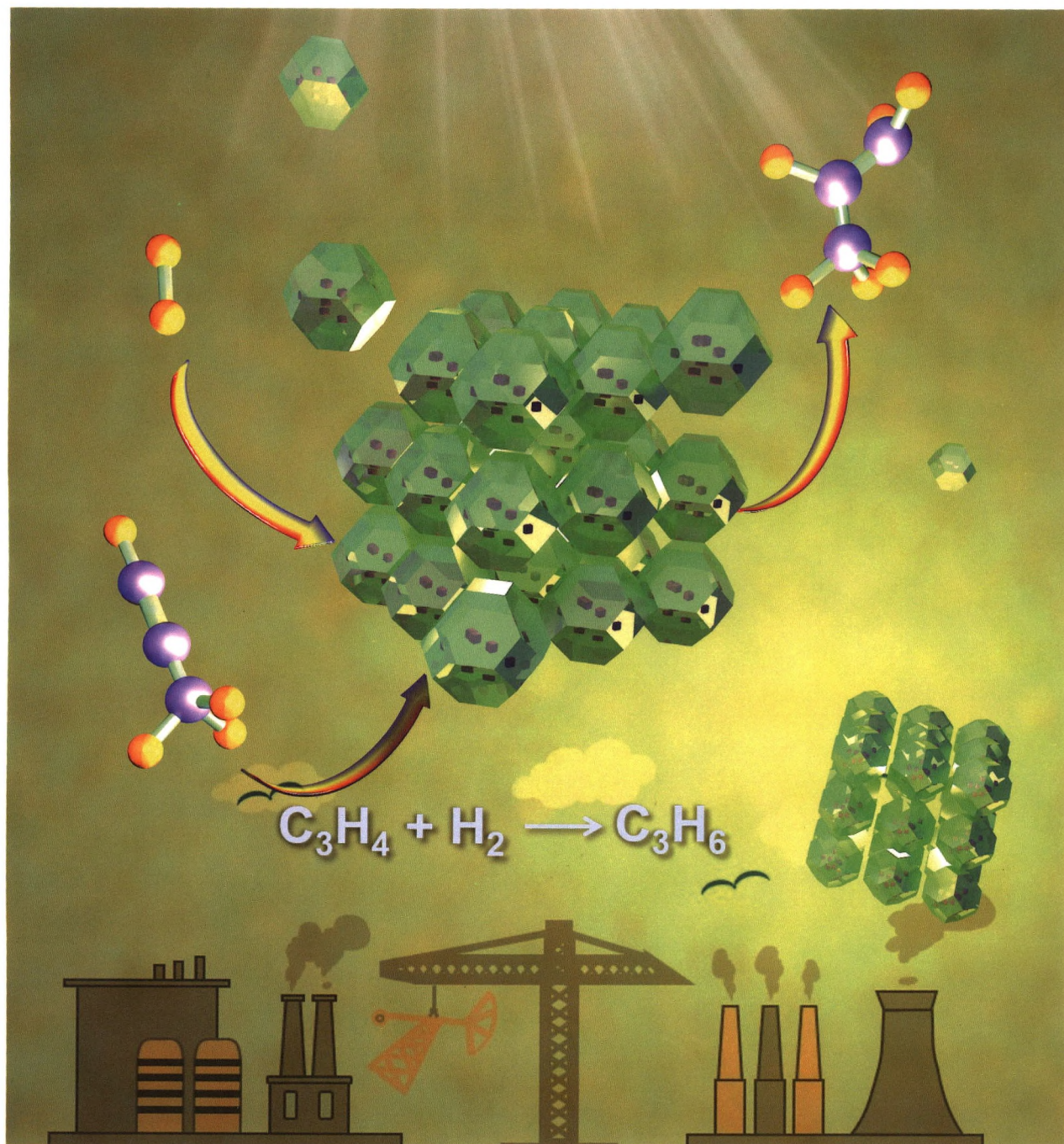
Xiao-Fei Yu, Wen-Cui Li, You-Ren Hu, Cheng-Yu Ye, and An-Hui Lu*

Dalian University of Technology, China



Internal gridded hollow carbon spheres are synthesized from the conversion of solid polymer spheres under regulated pyrolysis micro-environment via an escaping gas diffusion-restricted strategy. The size of carbon-bridge grids can be regulated by tuning the crosslinking degree of polymers and pyrolysis conditions.

1565–1573



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