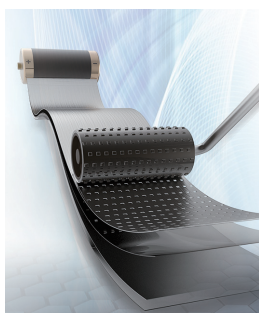


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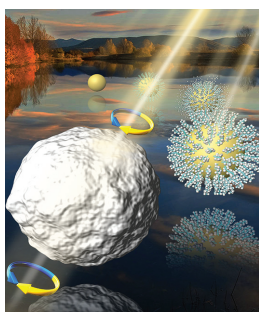
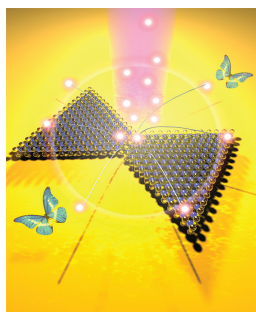


Surface Treatment

On page 834, a simple, scalable, and cost-efficient microneedles surface treatment technique provides a clever idea for lithium battery technology. M.-H. Ryou, P. Bieker, and colleagues develop a simple rolling process by using a microneedle roller, which is capable of creating inverse microneedles pattern over the wide area of Li metal surface improving the cycle retention abilities and the power capabilities.

Monolayer Films

Q. Fu, Y. Zhang, and co-workers identify the crystal orientations and domain boundaries of MoS_2 flakes directly on Au foils on page 842 by using low-energy electron microscopy/diffraction for the first time. These transfer-free characterizations should shed light on the initial growth and the aggregation of MoS_2 .

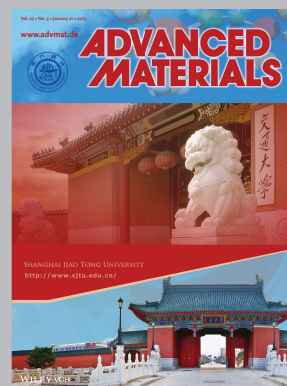
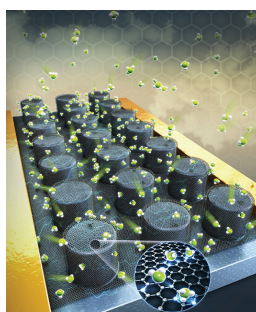


Nanoparticles

H. Kuang and team develop Au core-DNA-Ag shell nanoparticles (NPs) with distinctive chiroplasmonic performances for the first time on page 850. The NPs exhibit very intense CD activities with the highest g-factor value. The CD responses of the individual NPs can be controllably manipulated by altering the Ag shell thickness. The optically active NPs open up avenues for chiral catalysis and chirophotonic devices applications.

Gas Sensors

N.-E. Lee and co-workers demonstrate a new approach for enhancement of sensing capability of chemiresistive gas sensors based on reduced graphene oxide (R-GO) through extension of device geometry by using three-dimensional (3D) SU-8 micro-pillar array. On page 883 the combination of controllable 3D structure and easily modifiable R-GO can offer a good premise to maximize the advantages of the multi-scale hybridization of R-GO for contemporary and future sensing devices.



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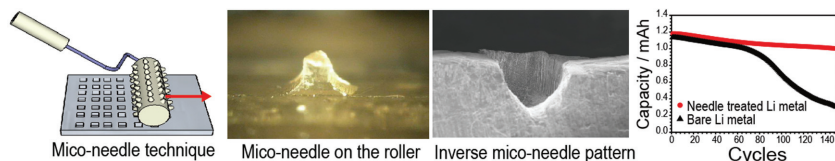
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FULL PAPERS

The simple, scalable, and cost-efficient surface treatment technique for Li metal is developed. With a simple rolling process, the micro-needles create an inverse micro-needles pattern over wide area of Li metal surface, which remarkably enhances the power capabilities and cycle retention abilities to those of the bare Li metal.

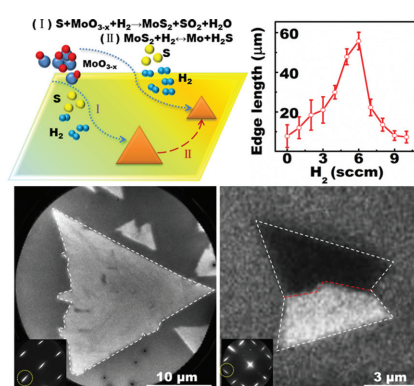


Surface Treatment

M.-H. Ryou,* Y. M. Lee, Y. Lee,
M. Winter, P. Bieker*834–841

Mechanical Surface Modification of Lithium Metal: Towards Improved Li Metal Anode Performance by Directed Li Plating

The monolayer molybdenum disulfide growth process is proposed to be mediated by two competitive effects with hydrogen acting as both a reduction promoter for efficient sulfurization of MoO_3 and an etching reagent of resulting molybdenum disulfide flakes. By using low-energy electron microscopy/diffraction, the crystal orientations and domain boundaries of molybdenum disulfide flakes are identified directly on Au foils for the first time.

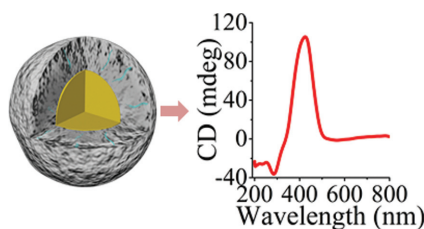


Monolayer Films

J. Shi, Y. Yang, Y. Zhang, D. Ma,
W. Wei, Q. Ji, Y. Zhang, X. Song,
T. Gao, C. Li, X. H. Bao, Z. Liu, Q. Fu,*
Y. Zhang*842–849

Monolayer MoS_2 Growth on Au Foils and On-Site Domain Boundary Imaging

Au core-DNA-Ag shell nanoparticles (NPs) are successfully fabricated for the first time. They exhibit very intense circular dichroism activities in the visible range, with the highest g -factor value for the individual NPs with chiroplasmonic activity. The plasmonic mechanism is explored, which is from the induction of DNA-plasmon interaction and further amplification by the electromagnetic coupling of the core-shell structure.

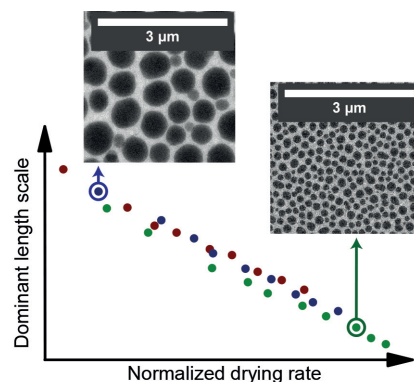


Nanoparticles

X. Wu, L. Xu, W. Ma, L. Liu, H. Kuang,*
W. Yan, L. Wang, C. Xu850–854

Gold Core-DNA-Silver Shell Nanoparticles with Intense Plasmonic Chiroptical Activities

Droplet formation occurs in many solution-processed organic semiconductor blends due to liquid-liquid phase separation. The combination of in situ measurements, a simple numerical spin coating model, and advanced image analysis on transmission electron micrographs show that the dominant length scale scales with a normalized drying rate, which is defined as the solvent evaporation rate divided by the dry layer thickness.



Thin Films

J. J. van Franeker, D. Westhoff,
M. Turbiez, M. M. Wienk, V. Schmidt,
R. A. J. Janssen*855–863

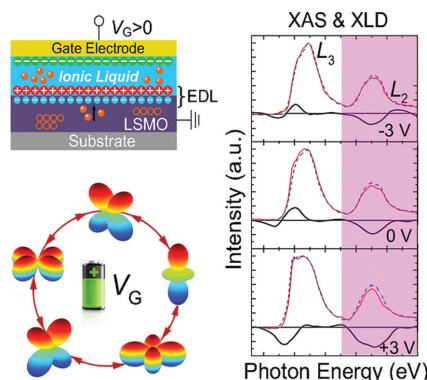
Controlling the Dominant Length Scale of Liquid-Liquid Phase Separation in Spin-coated Organic Semiconductor Films

FULL PAPERS

Electrical Control

B. Cui, C. Song,* G. A. Gehring,
F. Li, G. Y. Wang, C. Chen, J. J. Peng,
H. J. Mao, F. Zeng, F. Pan* 864–870

Electrical Manipulation of Orbital Occupancy and Magnetic Anisotropy in Manganites



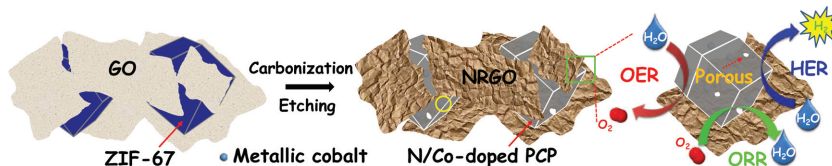
The orbital occupancy and magnetic anisotropy of (La,Sr)MnO₃ films are manipulated by gate voltage in a reversible and quantitative manner, accompanied with the electronic phase transition. Positive and negative gate voltage increases and reduces the occupancy of the orbital and magnetic anisotropy that are initially favored by strain (irrespective of tensile and compressive), respectively.

Hybrid Electrocatalysis

Y. Hou, Z. H. Wen,* S. Cui, S. Q. Ci,
S. Mao, J. H. Chen* 872–882

An Advanced Nitrogen-Doped Graphene/Cobalt-Embedded Porous Carbon Polyhedron Hybrid for Efficient Catalysis of Oxygen Reduction and Water Splitting

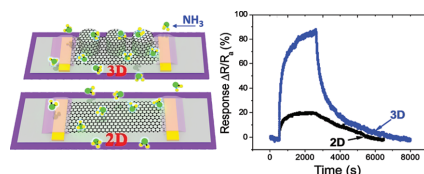
A novel hybrid electrocatalyst consisting of nitrogen-doped graphene/cobalt-embedded porous carbon polyhedron (N/Co-doped PCP//NRGO) is obtained through a simple pyrolysis of graphene oxide-supported cobalt-based zeolitic imidazolate-frameworks. The hybrid exhibits excellent electrocatalytic activities for oxygen reduction, hydrogen evolution, and oxygen evolution reactions with good stability. The enhanced performance is correlated with the dual-active-site mechanism originating from synergic effects between N/Co-doped PCP and NRGO sheets.



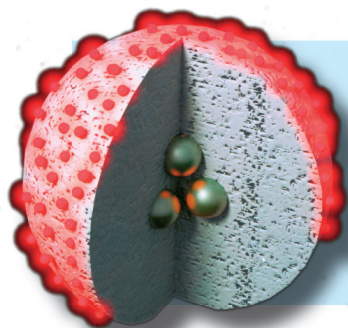
Gas Sensors

L. T. Duy, D.-J. Kim, T. Q. Trung,
V. Q. Dang, B.-Y. Kim, H. K. Moon,
N.-E. Lee* 883–890

High Performance Three-Dimensional Chemical Sensor Platform Using Reduced Graphene Oxide Formed on High Aspect-Ratio Micro-Pillars



A possibility of sensing enhancement of chemiresistor gas sensors based on reduced graphene oxide (R-GO) through extension of device channel geometry by using three-dimensional (3D) SU-8 micro-pillar array is discussed. The combination of controllable 3D structure and easily modifiable R-GO reveals a good premise to maximize the advantages of the multi-scale hybridization of R-GO for contemporary and future sensing devices.



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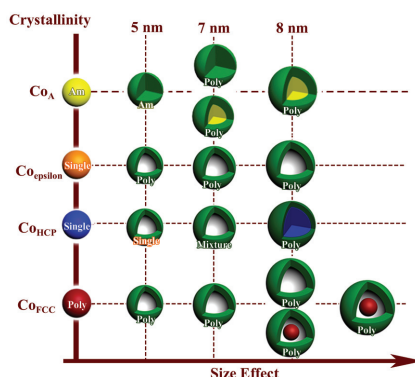
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FULL PAPERS

Size-dependent Kirkendall effect is studied by using Co nanoparticles. The nanoparticles self-assembled into 2D superlattices and differing by their nanocrystallinities are subjected to oxygen. Different performances in size effect are attributed to the change in the control of the inward flow of oxygen atoms and the outward flow of Co atoms with the crystalline structures of cobalt nanoparticles.

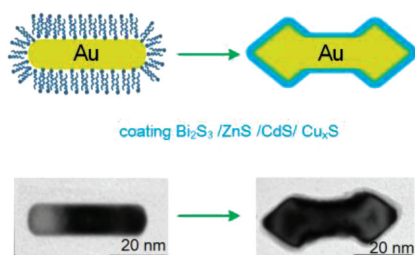


Metallic Nanomaterials

Z. Yang, N. Yang, J. Yang, J. Bergström, M.-P. Pileni*891–897

Control of the Oxygen and Cobalt Atoms Diffusion through Co Nanoparticles Differing by Their Crystalline Structure and Size

A facile method is reported to synthesize dumbbell-like Au–metal sulfide nanorods (including CdS, Bi₂S₃, ZnS, and Cu_xS) with highly enhanced visible light absorption and strong local electric field. The double-shell Au–Bi₂S₃–CdS hetero-nanostructures show efficiently improved photodegradation rate, especially about 2 times that of Degussa P25 TiO₂ (P25).

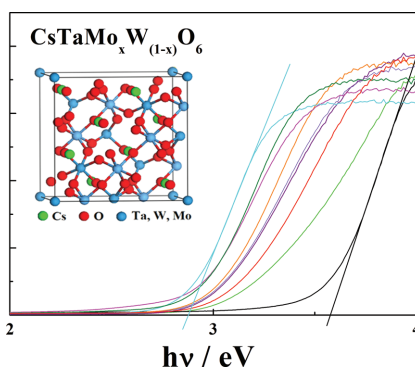


Nanocarriers

L. Ma, S. Liang, X.-L. Liu, D.-J. Yang, L. Zhou,* Q.-Q. Wang*898–904

Synthesis of Dumbbell-Like Gold–Metal Sulfide Core–Shell Nanorods with Largely Enhanced Transverse Plasmon Resonance in Visible Region and Efficiently Improved Photocatalytic Activity

CsTaWO₆ is a unique photocatalyst with two d⁰ elements, exhibiting a defect-pyrochlore structure. By variation of its lattice composition, the photocatalytic properties of the material are investigated, in pursuit of revealing the active sites for water oxidation and reduction reactions without any cocatalyst, and for the first time oxygen evolution in visible light with CoPi–CsTaMoO₆.

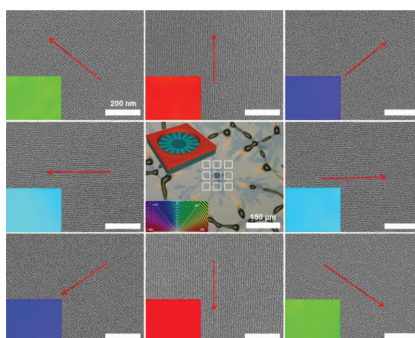


Photocatalysis

L. Schwertmann, A. Grünert, A. Pougin, C. Sun, M. Wark, R. Marshall*905–912

Understanding the Influence of Lattice Composition on the Photocatalytic Activity of Defect-Pyrochlore-Structured Semiconductor Mixed Oxides

Extremely straight and laterally aligned cylindrical microdomains of block copolymer (BCP) films are prepared by simply covering the BCP films with a top coat and dewetting the latter via thermal annealing to generate shear flow in the BCP underlayer. This alignment is at least 150 μm long and the aspect ratio is higher than 15 000:1.



Block Copolymers

E. Yoon, E. Kim, D. Kim, J. G. Son*913–919

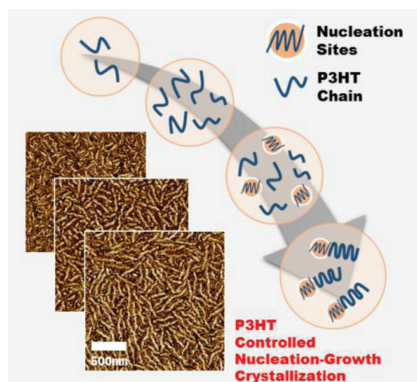
Top-Coat Dewetting for the Highly Ordered Lateral Alignment of Block Copolymer Microdomains in Thin Films

FULL PAPERS

Organic Electronics

D. Choi, M. Chang,
E. Reichmanis* 920–927

Controlled Assembly of Poly(3-hexylthiophene): Managing the Disorder to Order Transition on the Nano-through Meso-Scales

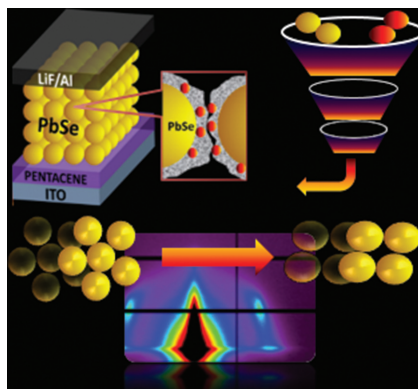


Mechanistic elucidation of P3HT molecular assembly is presented based on the experimental demonstration of controlled P3HT nanorod fabrication. The 2-step crystallization model comprises nucleation and growth steps, and is successfully adopted to interpret P3HT assembly into mesoscale entities. Systematic control of nucleation and growth allows formation of P3HT nanostructures exhibiting enhanced charge transport performance.

Nanocrystals

D. Asil, B. J. Walker, B. Ehrler, Y. Vaynzof,
A. Sepe, S. Bayliss, A. Sadhanala,
P. C. Y. Chow, P. E. Hopkinson,
U. Steiner, N. C. Greenham,
R. H. Friend* 928–935

Role of PbSe Structural Stabilization in Photovoltaic Cells

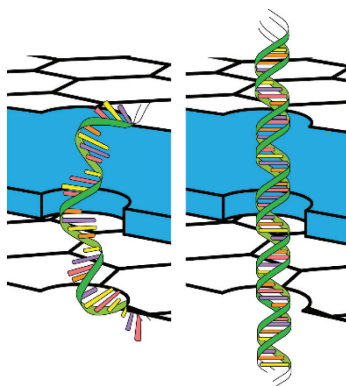


Inorganic treatment of nanocrystals removes traps, increases long-range ordering of the symmetry, and improves stability in solar cells. A combination of optical, electronic, and material characterization tools demonstrates that chloride treatment confers many benefits on photovoltaic materials.

Nanopores

S. Banerjee, J. Wilson, J. Shim,
M. Shankla, E. A. Corbin,
A. Aksimentiev,* R. Bashir* 936–946

Slowing DNA Transport Using Graphene–DNA Interactions

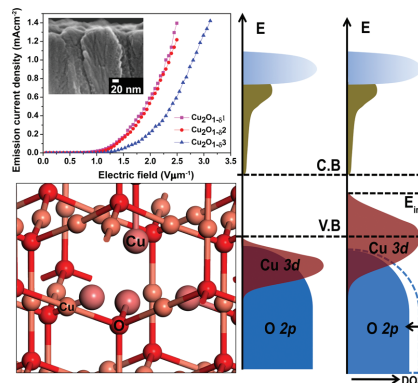


Graphene–DNA hydrophobic interactions slow DNA transport through a nanopore. The introduction of graphene layers makes the pore and membrane surface hydrophobic, leading to sticking interactions with the ssDNA molecules. On the other hand, dsDNA has far less significant hydrophobic interactions with graphene as nucleobases are shielded in the helical structure.

Nanostructures

S. Nandy,* R. Thapa, M. Kumar, T. Som,
N. Bundaleski, O. M. N. D. Teodoro,
R. Martins, E. Fortunato* 947–956

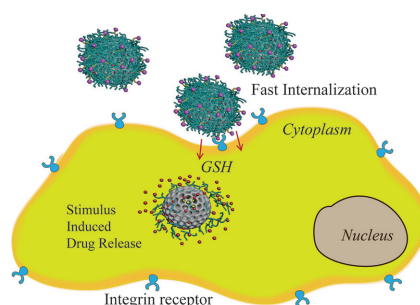
Efficient Field Emission from Vertically Aligned $\text{Cu}_2\text{O}_{1.8}$ (111) Nanostructure Influenced by Oxygen Vacancy



$\text{Cu}_2\text{O}_{1.8}$ (111) exhibits promising field emission properties with interesting electron tunneling behavior at low turn-on and threshold voltages of 0.8 and 2.4 $\text{V } \mu\text{m}^{-1}$ respectively. Density functional theory suggests that oxygen vacancies enhance the electron donating ability because of unshared d -electrons of Cu atoms (nearest to the vacancy site), allowing an impurity energy state (E_{im}) close to the conduction band.

FULL PAPERS

A simple and robust polymer-gatekeeper is developed to load a large mass of hydrophilic drugs inside the nonfunctionalized mesoporous silica. The ligand attached polymer-gatekeeper can target specific cancer cells. Opening the gate inside cells by degradation of crosslinked polymer shell in response to the intracellular glutathione triggers the drug release inside the cancer cells to induce cell death.

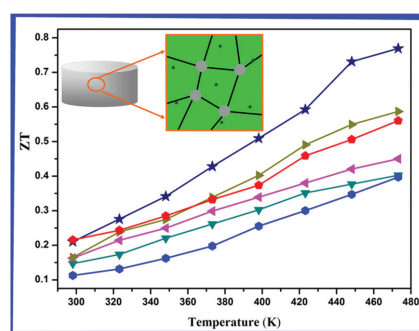


Intracellular Delivery

L. Palanikumar, E. S. Choi, J. Y. Cheon, S. H. Joo,* J.-H. Ryu*957–965

Noncovalent Polymer-Gatekeeper in Mesoporous Silica Nanoparticles as a Targeted Drug Delivery Platform

A hierarchical two-phased heterostructure deriving from silver nanoparticles and Bi_2Te_3 is constructed through a bottom-up chemical route, which causes strong scattering of phonons across integrated length scales, significantly reducing the lattice thermal conductivity. Meanwhile, the power factor is improved due to the combination of low-energy electron filtering and excellent electrical transport property of silver itself.

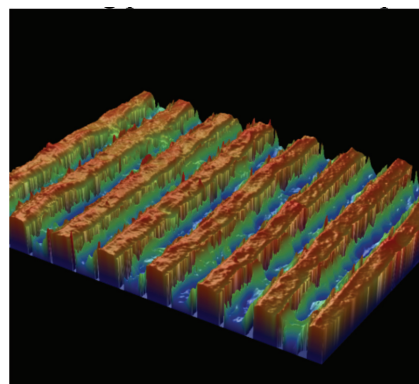


Thermoelectrics

Q. H. Zhang, X. Ai, L. J. Wang,* Y. X. Chang, W. Luo, W. Jiang,* L. D. Chen966–976

Improved Thermoelectric Performance of Silver Nanoparticles-Dispersed Bi_2Te_3 Composites Deriving from Hierarchical Two-Phased Heterostructure

A photodegradable hydrogel comprising a gelatin methacrylamide and an *o*-nitrobenzyl PEG crosslinker is utilized to create patterned substrates for tissue engineering. Photodegradation enables a facile method of creating striped patterns onto the gels. Patterned hydrogels are shown to improve the degree of alignment and beating regularity of cultured cardiomyocytes, showing promise for culture platforms with spatiotemporal control capabilities.



Gelatin Hydrogels

K. M. C. Tsang, N. Annabi, F. Ercole, K. Zhou, D. Karst, F. Li, J. M. Haynes, R. A. Evans, H. Thissen, A. Khademhosseini,* J. S. Forsythe*977–986

Facile One-Step Micropatterning Using Photodegradable Gelatin Hydrogels for Improved Cardiomyocyte Organization and Alignment