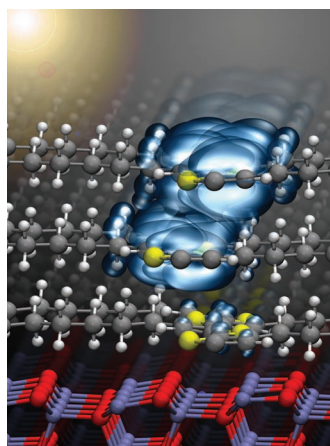


ADVANCED FUNCTIONAL MATERIALS

www.afm-journal.de

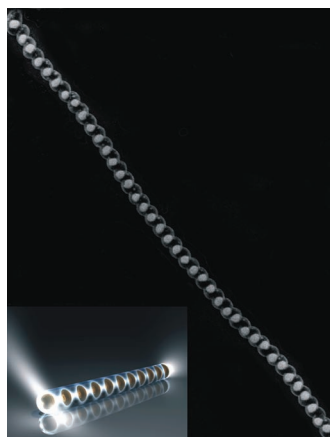
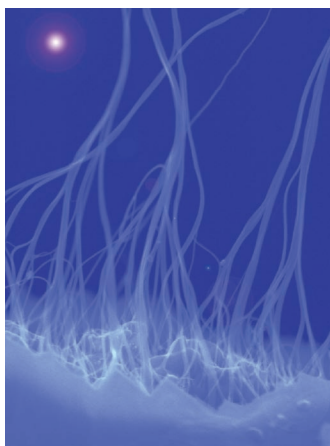


Solar Cells

On page 5089, Keian Noori and Feliciano Giustino report a first-principles atomic-scale investigation of the photovoltaic interface between ZnO and poly(3-hexylthiophene) (P3HT). It is shown that the ideal open-circuit voltage of this interface, i.e., the maximum voltage that can be achieved in the absence of defects, is significantly higher than previous estimates. This finding makes ZnO/P3HT blends attractive for nanostructured photovoltaics. The image shows an atomistic model of the ZnO/P3HT interface and the highest occupied molecular orbital of the polymer.

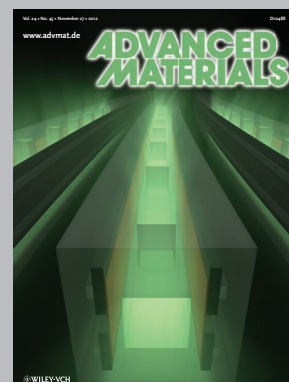
Nanocomposites

A new strategy for fabricating Cu/single-walled carbon nanotube (SWCNT)/Cu laminated nanocomposites is reported by Weiya Zhou, Sishen Xie, and co-workers on page 5209. The Cu/SWCNT/Cu laminated nanocomposites exhibit excellent mechanical properties and realize an effective transfer of the outstanding mechanical properties of SWCNTs to the composites. This results from the continuous reticulate architecture of SWCNT films and the optimization of interfacial strength between SWCNTs and the Cu matrix.



Waveguides

A guided Rayleigh instability is applied to synthesize Au/Al₂O₃ nanopeapods with narrow interparticle spacing and regular interparticle distances by annealing carbon nanocoils coated with Au by sputtering and Al₂O₃ by atomic layer deposition. On page 5157, Yong Qin, Mato Knez, and co-workers demonstrate the strong plasmonic activity of the nanopeapods using confocal laser scanning microscopy, electron energy-loss spectroscopy, energy-filtered transmission electron microscopy imaging, and numerical simulations. The results indicate that the nanopeapods are promising candidates for stable, highly efficient, and ultrathin waveguides.



Advanced Materials has been bringing you the best in materials research for over twenty years.

With its increased ISI Impact Factor of 13.877, *Advanced Materials* is one of the most influential journals in the field. Publishing every week, *Advanced Materials* now brings you even more of the latest results at the cutting edge of materials science.

www.advmat.de



Small is the very best interdisciplinary forum for all experimental and theoretical aspects of fundamental and applied research at the micro and nano length scales.

With an ISI impact Factor of 8.349 and publishing every two weeks in 2012 with papers online in advance of print, *Small* is your first-choice venue for top-quality communications, detailed full papers, cutting-edge concepts, and in-depth reviews of all things micro and nano.

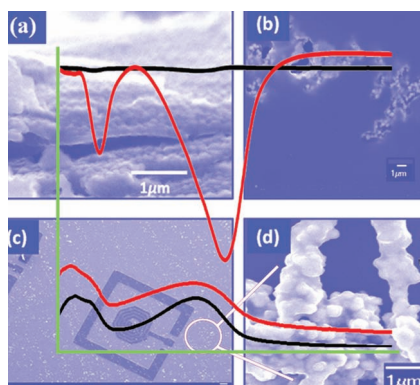
www.small-journal.com

FULL PAPERS

Supramolecular Materials

H. S. Oh, H. Jee, A. Baev,
M. T. Swihart,*
P. N. Prasad* 5074–5080

Dramatic Structural Enhancement of Chirality in Photopatternable Nanocomposites of Chiral Poly(fluorene-*alt*-benzothiadiazole) (PFBT) in Achiral SU-8 Photoresist

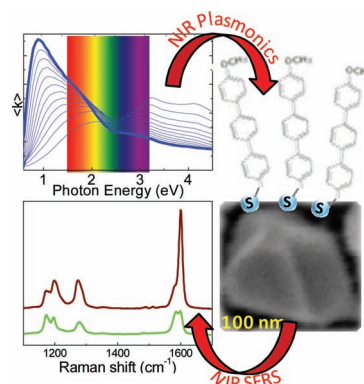


Nanocomposites of chiral poly(fluorene-*alt*-benzothiadiazole) (PFBT) dispersed in achiral SU-8 photopolymer show dramatic enhancement of circular dichroism (CD). Thin films with a 1/20 to 1/40 ratio of PFBT/SU-8 have maximum CD values up to 75 times that of a pure chiral PFBT film of equal optical absorbance. This is attributed to supramolecular organization of chiral polymer fibrils.

Gold Nanoparticles

G. V. Bianco,* M. M. Giangregorio,
M. Losurdo, P. Capezzuto,
G. Bruno* 5081–5088

Supported Faceted Gold Nanoparticles with Tunable Surface Plasmon Resonance for NIR-SERS

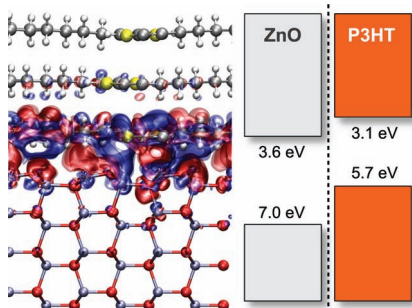


Faceted gold nanoparticles for near infrared surface enhanced Raman scattering (NIR SERS) are fabricated directly on technologically important substrates using a novel dry plasma methodology.

Solar Cells

K. Noori, F. Giustino* 5089–5095

Ideal Energy-Level Alignment at the ZnO/P3HT Photovoltaic Interface

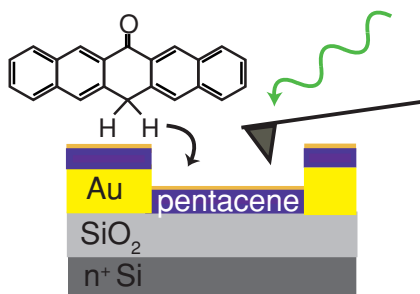


Using first-principles calculations the energy-level alignment of organic/inorganic solar cell interfaces based on ZnO and poly(3-hexylthiophene) (P3HT) is investigated. The interfacial charge transfer is shown to increase the ideal open-circuit voltage with respect to the electron-affinity rule by 0.5 V. The findings suggest that there is room for improving the efficiency of these devices by tailoring the semiconductor/polymer interface at the nanometer-scale.

Thin Films

L. M. Smieska, V. A. Pozdin, J. L. Luria,
R. G. Hennig, M. A. Hines, C. A. Lewis,
J. A. Marohn* 5096–5106

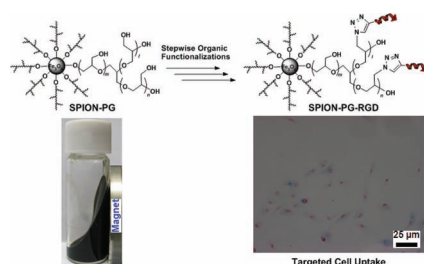
Following Chemical Charge Trapping in Pentacene Thin Films by Selective Impurity Doping and Wavelength-Resolved Electric Force Microscopy



Thin pentacene films are layered with putative pentacene trap-precursors and the resulting spatial distribution of charge traps and spectroscopic trap-clearing rates under illumination are measured with time- and wavelength-resolved electric force microscopy. Pentacen-6(13H)-one efficiently generates charged traps with trap-clearing spectra resembling those of aged pentacene, while 6,13-dihydropentacene does not. It is concluded that PHO⁺ is the charged trap species.

FULL PAPERS

Superparamagnetic iron oxide nanoparticles (SPIONs) are directly functionalized with polyglycerol (PG) using ring-opening polymerization of glycidol to obtain good solubility in pure water and in a phosphate buffer solution. The resulting SPION-PG is further functionalized through multistep organic transformations to immobilize a targeting peptide on the surface. The targeting effect is demonstrated in cell experiments.

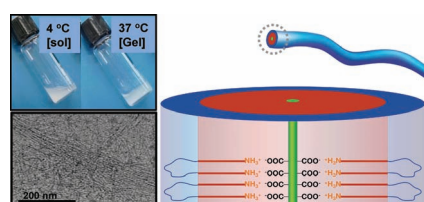


Nanoparticles

L. Zhao, T. Chano, S. Morikawa, Y. Saito, A. Shiino, S. Shimizu, T. Maeda, T. Irie, S. Aonuma, H. Okabe, T. Kimura, T. Inubushi, N. Komatsu* 5107–5117

Hyperbranched Polyglycerol-Grafted Superparamagnetic Iron Oxide Nanoparticles: Synthesis, Characterization, Functionalization, Size Separation, Magnetic Properties, and Biological Applications

A thermogelling system is prepared by a self-assembling ionic complex between amphiphilic peptide block copolymers with a rigid-flexible block structure (polyalanine-PLX-polyalanine; PA-PLX-PA) and hyaluronic acid (HA). The system develops a biomimetic long range nanofibrous orientation and provides a promising 3D cell culture matrix with improved biomarker expression.

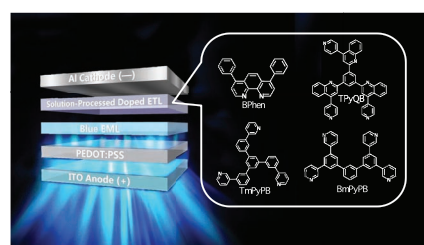


Biomimetics

M. H. Park, B. G. Choi, B. Jeong* 5118–5125

Complexation-Induced Biomimetic Long Range Fibrous Orientation in a Rigid-Flexible Block Copolymer Thermogel

High-performance blue phosphorescent organic light-emitting diodes (PhOLEDs) are achieved by orthogonal solution-processing of small-molecule electron-transport material (ETM) doped with an alkali metal salt, Cs_2CO_3 or Li_2CO_3 . It is shown for the first time that various ETMs can be solution-doped with alkali metal salt to fabricate high-performance PhOLEDs. The demonstrated approach is a promising strategy for solution-processed organic electronic devices.

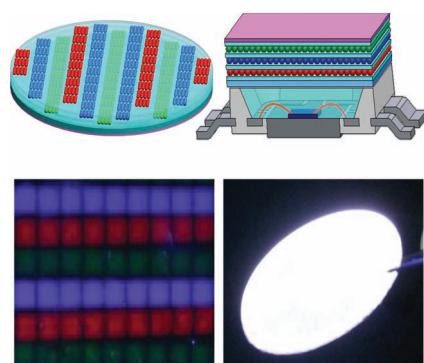


Organic Electronics

T. Earmme, S. A. Jenekhe* 5126–5136

Solution-Processed, Alkali Metal-Salt-Doped, Electron-Transport Layers for High-Performance Phosphorescent Organic Light-Emitting Diodes

A colloidal quantum-dot light-emitting multilayer structure with a $\text{HfO}_2/\text{SiO}_2$ -distributed Bragg reflector is manufactured using a pulsed spray method. Polydimethylsiloxane (PDMS) is used as the interface layer between each RGB (red-green-blue) color to avoid a cross-contamination phenomenon. Pure white light with strong enhancement resulting from superior use of a UV pump is demonstrated.



Light-Emitting Diodes

K.-J. Chen, H.-C. Chen, K.-A. Tsai, C.-C. Lin,* H.-H. Tsai, S.-H. Chien, B.-S. Cheng, Y.-J. Hsu, M.-H. Shih, C.-H. Tsai, H.-H. Shih, H.-C. Kuo* 5138–5143

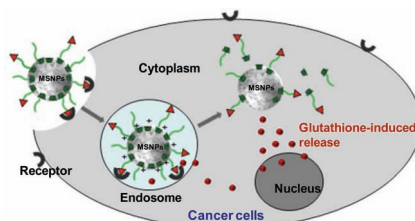
Resonant-Enhanced Full-Color Emission of Quantum-Dot-Based Display Technology Using a Pulsed Spray Method

FULL PAPERS

Drug Delivery

Q. Zhang, F. Liu, K. T. Nguyen,
X. Ma, X. Wang, B. Xing,
Y. L. Zhao* 5144–5156

Multifunctional Mesoporous Silica Nanoparticles for Cancer-Targeted and Controlled Drug Delivery



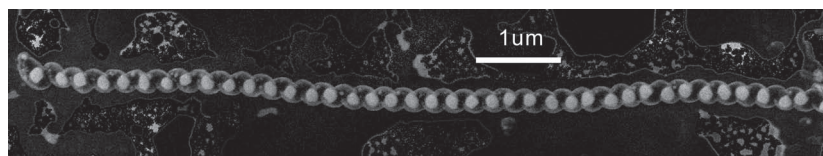
Multifunctional mesoporous silica nanoparticles are developed in order to deliver anticancer drugs to specific cancer cells in a targeted and controlled manner. Doxorubicin-loaded nanoparticles containing folate target units can be efficiently trapped by folate-receptor-rich HeLa cancer cells through receptor-mediated endocytosis, leading to the release of doxorubicin triggered by acidic endosomal pH and intracellular glutathione for apoptosis.

Nanoparticles

Y. Qin,* R. Vogelgesang, M. Eßlinger,
W. Sigle, P. van Aken, O. Moutanabbir,
M. Knez* 5157–5165

Bottom-Up Tailoring of Plasmonic Nanopeapods Making Use of the Periodical Topography of Carbon Nanocoil Templates

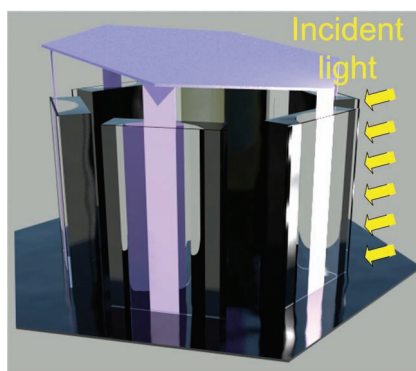
Regularly spaced Au nanoparticle chains embedded in helical Al_2O_3 nanotubes (“nanopeapods”) are synthesized based on a guided Rayleigh instability. This is achieved by annealing carbon nanocoils coated with Au by sputtering and Al_2O_3 by atomic layer deposition. Their strong plasmonic resonance behavior is revealed by confocal laser scanning microscopy, electron energy-loss spectroscopy, and numerical simulations.



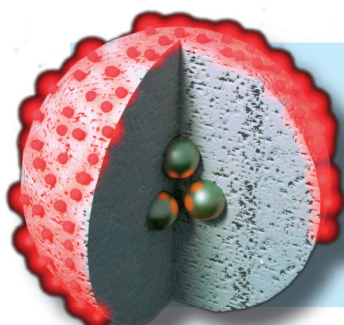
Nanocomposites

C. S. Li, Y. Liu, X. Huang,
H. Jiang* 5166–5174

Direct Sun-Driven Artificial Heliotropism for Solar Energy Harvesting Based on a Photo-Thermomechanical Liquid-Crystal Elastomer Nanocomposite



A **photo-thermomechanical liquid-crystalline elastomer (LCE) nanocomposite** is developed and utilized to realize artificial heliotropism. The LCE nanocomposite actuators respond to light and, in turn, drive solar cells to track the light source. Full-range heliotropism is shown in both laboratory and in-field tests under natural sunlight. A significant increase in the photocurrent output from the solar cells in the artificial heliotropic devices is observed.



How to contact us:

Editorial Office:

Phone: (+49) 6201-606-235/531
Fax: (+49) 6201-606-500
Email: afm@wiley-vch.de

Reprints:

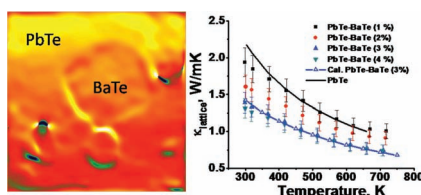
cherth@wiley-vch.de

Copyright Permission:

Fax: (+49) 6201-606-332
Email: rights@wiley-vch.de

FULL PAPERS

The effect of the coexistence of point defects and nanometer-scale precipitates on lattice thermal conductivity is understood by careful transmission electron microscope study and a proposed Callaway model.

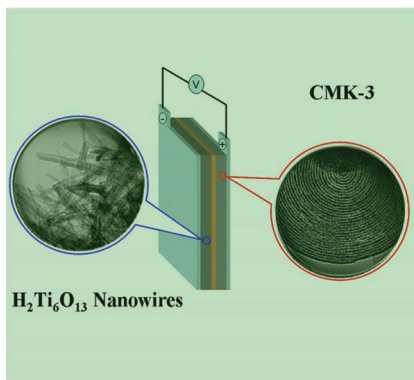


Thermoelectrics

S.-H. Lo, J. Q. He,*
K. Biswas, M. G. Kanatzidis,
V. P. Dravid* 5175–5184

Phonon Scattering and Thermal Conductivity in p-Type Nanostructured PbTe-BaTe Bulk Thermoelectric Materials

$\text{H}_2\text{Ti}_6\text{O}_{13}$ -nanowires with expanded interlayer space display a high capacitance in non-aqueous electrolyte solution. The asymmetric supercapacitor, which is based on a negative electrode of $\text{H}_2\text{Ti}_6\text{O}_{13}$ -nanowires and a positive electrode of ordered mesoporous carbon (CMK-3), exhibits a high energy density of 90 Wh kg^{-1} .

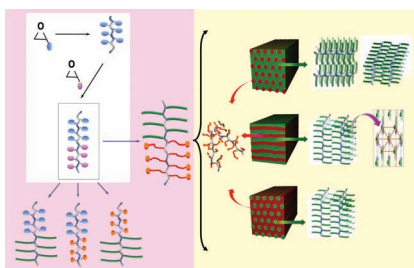


Supercapacitors

Y. G. Wang,* Z. S. Hong, M. D. Wei,*
Y. Y. Xia* 5185–5193

Layered $\text{H}_2\text{Ti}_6\text{O}_{13}$ -Nanowires: A New Promising Pseudocapacitive Material in Non-Aqueous Electrolyte

Well-defined and selectively functionalizable linear aliphatic diblock copolyethers are successfully synthesized without any side reactions via sequential step feed of the comonomers. Each block of the diblock copolyether selectively undergoes deprotection and post chemical functionalizations. Moreover, the diblock copolyethers undergo phase-separation and molecular ordering, and form various nanostructures, depending on the compositions and selective post chemical modifications.

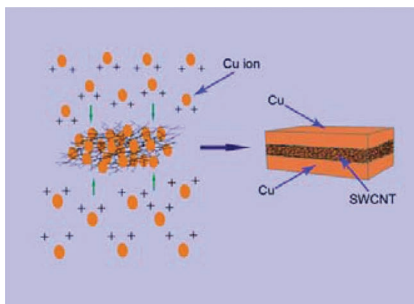


Block Copolymers

W. Kwon, Y. Rho, K. Kamoshida,
K. H. Kwon, Y. C. Jeong, J. Kim,
H. Misaka, T. J. Shin, J. Kim, K.-W. Kim,
K. S. Jin, T. Chang, H. Kim, T. Satoh,*
T. Kakuchi,* M. Ree* 5194–5208

Well-Defined Functional Linear Aliphatic Diblock Copolyethers: A Versatile Linear Aliphatic Polyether Platform for Selective Functionalizations and Various Nanostructures

A strategy for fabricating Cu/single-walled carbon nanotube (SWCNT)/Cu laminated nanocomposites is proposed using a SWCNT film as the template. The resulting Cu/SWCNT/Cu laminated nanocomposites exhibit excellent mechanical properties. An effective transfer of the outstanding mechanical properties of SWCNTs to the composites is realized by virtue of the continuous reticulate architecture of the SWCNT film and the optimization of interfacial strength between SWCNTs and the Cu matrix.



Nanocomposites

Z. Q. Niu, W. J. Ma, J. Z. Li,
H. B. Dong, Y. Ren, D. Zhao,
W. Y. Zhou,* S. S. Xie* 5209–5215

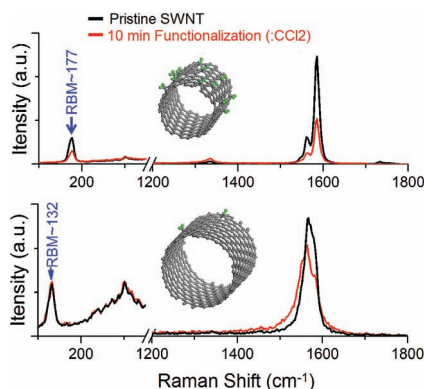
High-Strength Laminated Copper Matrix Nanocomposites Developed from a Single-Walled Carbon Nanotube Film with Continuous Reticulate Architecture

FULL PAPERS

Carbon Nanotubes

K. Zhang, Q. Zhang,* C. Liu,
N. Marzari, F. Stellacci 5216–5223

Diameter Effect on the Sidewall Functionalization of Single-Walled Carbon Nanotubes by Addition of Dichlorocarbene

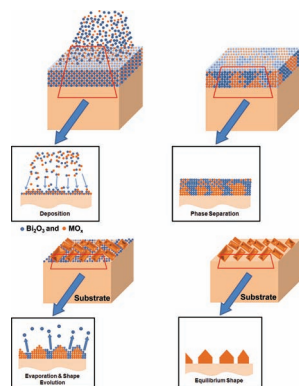


The influence of dichlorocarbene functionalization on the structural and electrical properties of individual single-walled carbon nanotubes (SWNTs) with diameters ranging from 1.2 to 2.2 nm are studied. SWNTs with small diameters are found to be functionalized more easily than those with large diameters. Furthermore, electrical conductance is preserved for most SWNTs, while effective bandgap variations are generally observed.

Phase Separation

K. A. Bogle, J. Cheung, Y.-L. Chen,
S.-C. Liao, C.-H. Lai, Y.-H. Chu,
J. M. Gregg, S. B. Ogale,
N. Valanoor* 5224–5230

Epitaxial Magnetic Oxide Nanocrystals Via Phase Decomposition of Bismuth Perovskite Precursors

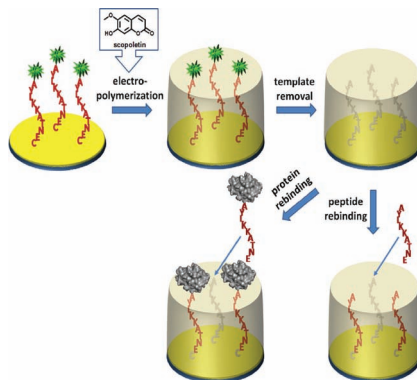


Ferromagnetic oxides ($M-O_x$, with $M = \text{Mn, Fe, Co, and Cr}$) nanocrystal arrays are synthesized using a template-free facile approach through decomposition of a pulsed laser deposited bismuth metal oxide (BiMO_3) precursor. This decomposition produces bismuth oxide (Bi_2O_3) and metal oxide ($M-O_x$) pockets. The subsequent cooling in vacuum volatilizes the Bi_2O_3 leaving an array of monodisperse nanocrystals.

Sensors

D. Dechtrirat, K. J. Jetzschmann,
W. F. M. Stöcklein, F. W. Scheller,
N. Gajovic-Eichelmann* 5231–5237

Protein Rebinding to a Surface-Confined Imprint

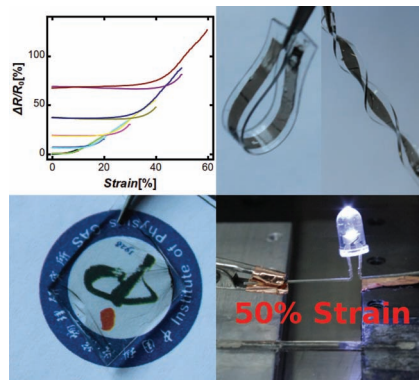


Surface imprinting of the C-terminal peptide epitope of cytochrome c can be achieved by forming an ultrathin polymer film of comparable thickness of the peptide template. The imprinted film shows selective binding to both the peptide template and target protein. The film is directly prepared on the electrode surface, making this strategy very useful for sensor applications.

Carbon Nanotubes

L. Cai, J. Z. Li, P. S. Luan, H. B. Dong,
D. Zhao, Q. Zhang, X. Zhang, M. Tu,
Q. S. Zeng, W. Y. Zhou,
S. S. Xie* 5238–5244

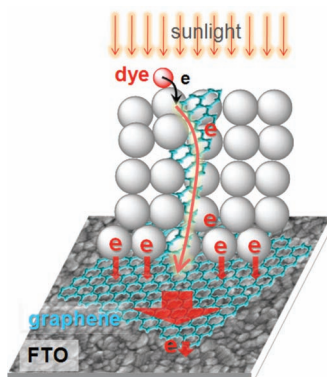
Highly Transparent and Conductive Stretchable Conductors Based on Hierarchical Reticulate Single-Walled Carbon Nanotube Architecture



Highly transparent and conducting stretchable conductors are fabricated by embedding hierarchical reticulate single-walled carbon nanotube (SWCNT) films in poly(dimethylsiloxane) (PDMS). The stretchable conductors can be programmed by the first loading–unloading cycle to tolerate a large strain without resistance changes. Conductance stabilization is achieved under repetitive stretching and relaxing. A light-emitting diode is illuminated using a stretchable conductor under large tensile strains, proving the feasibility of its utility as a stretchable interconnect.

FULL PAPERS

Graphene is found to suppress carrier recombination occurring on fluorinated tin oxide (FTO) surfaces and at FTO/TiO₂ interfaces in dye-sensitized solar cells. With a graphene interlayer between FTO and TiO₂, the device efficiency can be increased by 40% when compared with those using solely TiO₂ as an anode material.

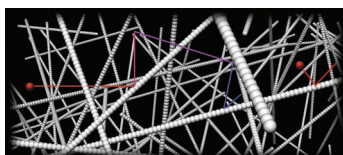


Solar Cells

T. Chen, W. Hu, J. Song, G. H. Guai,
C. M. Li* 5245–5250

Interface Functionalization of Photoelectrodes with Graphene for High Performance Dye-Sensitized Solar Cells

Inefficient energy exchange between gas molecules and single-walled carbon nanotubes (SWCNTs) permits gas molecules that permeate the aerogel to transport energy over distances hundreds of times larger than the aerogel pore diameter. Heat conduction through the SWCNT network is limited by thermal resistance at the van der Waals bonded tube–tube junctions, which is over one hundred times larger than that of the SWCNTs themselves.

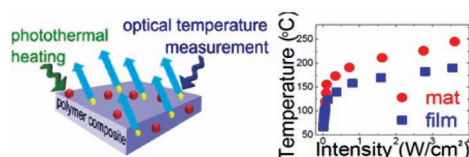


Carbon Nanotubes

S. N. Schiffres, K. H. Kim, L. Hu,
A. J. H. McGaughey, M. F. Islam,
J. A. Malen* 5251–5258

Gas Diffusion, Energy Transport, and Thermal Accommodation in Single-Walled Carbon Nanotube Aerogels

Low-intensity resonant frequency light is used to photothermally heat polymer composites doped with metal nanoparticles. A fluorescence-based temperature measuring technique is used to monitor the average bulk temperature of the composite during the photothermal process.

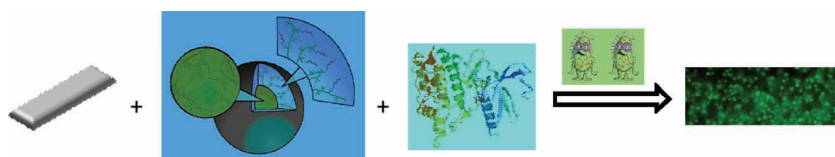


Composite Materials

S. Maity, J. R. Bochinski,
L. I. Clarke* 5259–5270

Metal Nanoparticles Acting as Light-Activated Heating Elements within Composite Materials

Quinone functionalized cross-linked nanogels are deposited onto industrial stainless steel surfaces precoated with a biomimetic glue. Antibacterial property is imparted to the surface by loading the nanogels with silver nanoparticles. The reactivity of the quinone groups of the nanogels towards thiol functions is exploited to afford long-term antibiofilm and antiadhesion properties to the substrate.



Functional Coatings

E. Faure, C. Falentin-Daudré,
T. S. Lanero, C. Vreuls, G. Zocchi,
C. V. De Weerd, J. Martial,
C. Jérôme, A.-S. Duwez,
C. Detrembleur* 5271–5282

Functional Nanogels as Platforms for Imparting Antibacterial, Antibiofilm, and Antiadhesion Activities to Stainless Steel