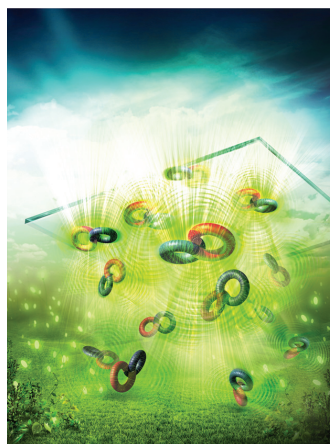


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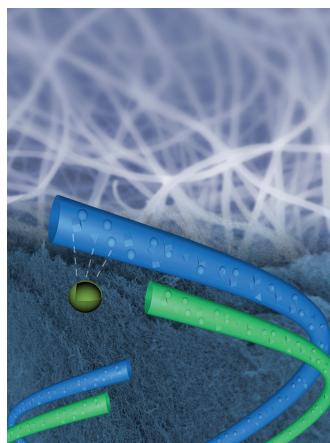
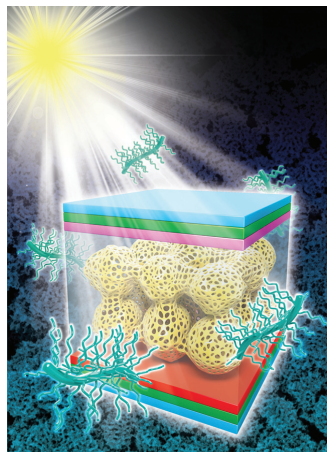


Light-Emitting Diodes

Green phosphorescent organic light-emitting diodes (OLEDs) based on a horizontally oriented emitter are analysed by J.-J. Kim and co-workers on page 3896. They demonstrate that theoretical analysis based on the orientation factor (the ratio of horizontal dipoles to total dipoles) and the quantum yield of the emitter predicts that the maximum EQE of OLEDs with this emitter is about 30%, matching experimental data, indicating that the electrical loss of the OLEDs is negligible and the device structure can be utilized as a platform to demonstrate the validity of optical modeling.

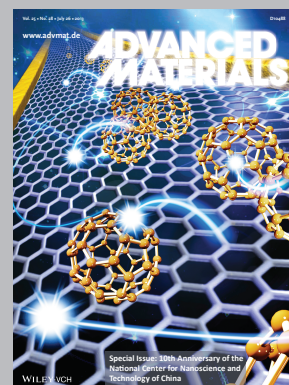
Solar Cells

A solid-state dye-sensitized solar cell with 7.4% efficiency is fabricated by J. H. Kim and co-workers using meso/macroscale, honeycomb-like, organized TiO_2 photoanodes. These electrodes have dual pores, high porosity, good interconnectivity, and excellent light scattering properties. On page 3901, an approach to control these structures via a one-step self-assembly of preformed TiO_2 nanocrystals and graft copolymers is presented.



Capacitors

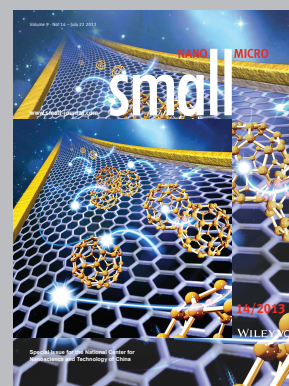
On page 3909, X. G. Zhang, X. W. Lou, and co-workers derive flexible porous films from electrospun carbon nanofibers incorporating Co_3O_4 hollow nanoparticles as advanced self-supported hybrid film electrodes for electrochemical capacitors. Such unique film electrodes exhibit very high specific capacitance and excellent electrochemical stability at high current densities. These features make them attractive for flexible power sources.



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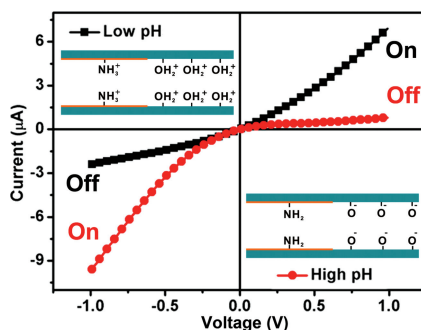
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FULL PAPERS

Nanofluidics

C.-Y. Li, F.-X. Ma, Z.-Q. Wu, H.-L. Gao, W.-T. Shao, K. Wang, X.-H. Xia* 3836–3844

Solution-pH-Modulated Rectification of Ionic Current in Highly Ordered Nanochannel Arrays Patterned with Chemical Functional Groups at Designed Positions

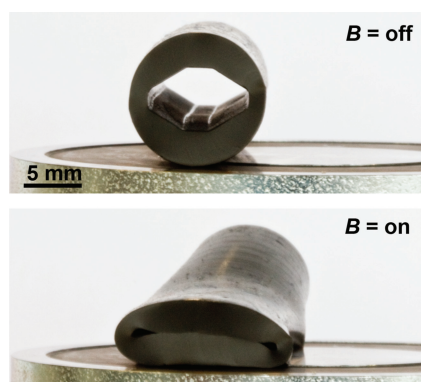


A new ionic current rectification device responsive to a broad range of pH stimuli is established using highly ordered nanochannels of porous anodic alumina membrane with abrupt surface charge discontinuity. Due to the protonation/deprotonation of the patterned amine and the remaining intrinsic hydroxyl groups, the nanochannel-array-based device is able to regulate ion transport selectivity and has ionic current rectification properties.

Composite Materials

R. Fuhrer, C. M. Schumacher, M. Zeltner, W. J. Stark* 3845–3849

Soft Iron/Silicon Composite Tubes for Magnetic Peristaltic Pumping: Frequency-Dependent Pressure and Volume Flow

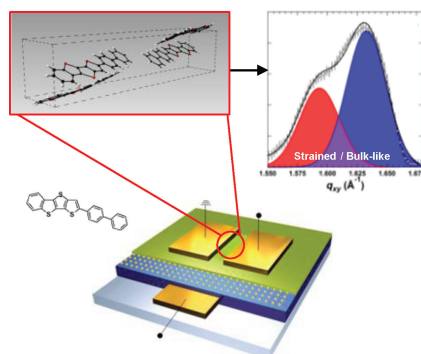


Magnetic silicone tubes with 67 wt% magnetic particles and an inner diameter of elliptical shape allow very efficient contractions of the tube by applying an external magnetic field. The combination of magnetic silicone tubes and a magnetic field generating device results in a magnetic peristaltic pump.

Transistors

J. Youn, S. Kewalramani, J. D. Emery, Y. Shi, S. M. Zhang, H.-C. Chang, Y.-j. Liang, C.-M. Yeh, C.-Y. Feng, H. Huang, C. Stern, L.-H. Chen, J.-C. Ho, M.-C. Chen,* M. J. Bedzyk,* A. Facchetti,* T. J. Marks* 3850–3865

Fused Thiophene Semiconductors: Crystal Structure–Film Microstructure Transistor Performance Correlations

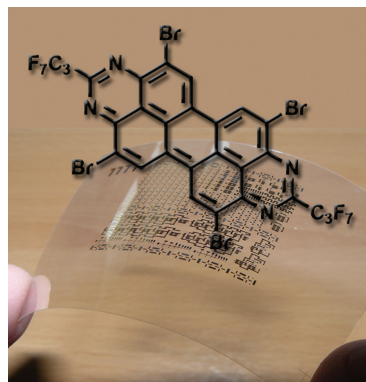


The thin film molecular packing motifs of several new benzo[d,d]thieno[3,2-b;4,5-b]dithiophene (BTDT) derivatives have different molecular packings from their bulk crystals. Co-existence of strained lattices with their single crystal forms is speculated to have a significant effect on organic thin-film transistor (OTFT) performance.

Flexible Electronics

S. Geib, U. Zschieschang, M. Gsänger, M. Stolte, F. Würthner, H. Wadepohl, H. Klauk,* L. H. Gade* 3866–3874

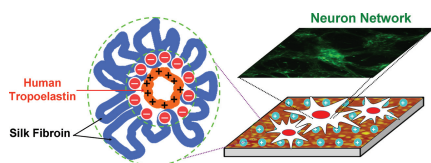
Core-Brominated Tetraazaperopyrenes as n-Channel Semiconductors for Organic Complementary Circuits on Flexible Substrates



The preparation of brominated tetraazaperopyrenes, their crystal structures, and their electrochemical properties are reported. These N-heterocyclic peropyrene derivatives are well-suited materials for the preparation of n-channel conducting organic thin-film transistors either by vacuum deposition or by solution processing. Additionally, the fabrication of a complementary ring oscillator on a flexible substrate is described.

FULL PAPERS

Molecular interaction mechanisms between silk fibroin and recombinant human tropoelastin are utilized to generate multifunctional protein alloys with different net charges. The combination of their properties in alloy format extends the versatility of both structural proteins, providing a new biocompatible, biodegradable, and charge-tunable biomaterial platform for neural repair.

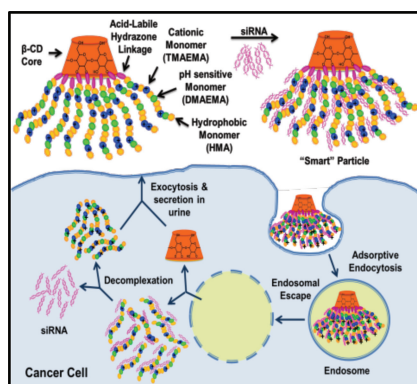


Tissue Engineering

X. Hu, M. D. Tang-Schomer, W. Huang, X.-X. Xia, A. S. Weiss, D. L. Kaplan*3875–3884

Charge-Tunable Autoclaved Silk-Tropoelastin Protein Alloys That Control Neuron Cell Responses

A series of degradable, pH-sensitive, membrane-destabilizing, star-shaped polymers is synthesized. Star polymers are engineered to “sense” the drop in endosomal pH, which triggers the hydrolysis of acid-labile hydrazone linkages and release of membrane-active grafts that rupture the endosomal membrane and release the loaded siRNA cargo into the cytoplasm to produce the desired knockdown of targeted gene expression at both the mRNA and protein levels.

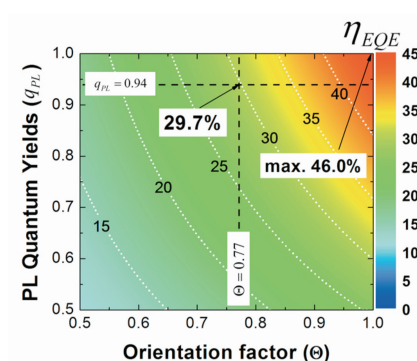


Stimuli-Responsive Materials

Y. Y. Durmaz, Y.-L. Lin, M. E. H. ElSayed* 3885–3895

Development of Degradable, pH-Sensitive Star Vectors for Enhancing the Cytoplasmic Delivery of Nucleic Acids

High-efficiency phosphorescent organic light-emitting diodes (OLEDs) doped with Ir(ppy)₃(acac) in an exciplex forming co-host have a preferred horizontal emitter orientation. Based on optical analysis a maximum efficiency of the OLEDs of about 30% is calculated, which matches very well with the experimental data. Furthermore, a simple method to predict the maximum efficiency achievable with a certain emitting dye in a host matrix is suggested.

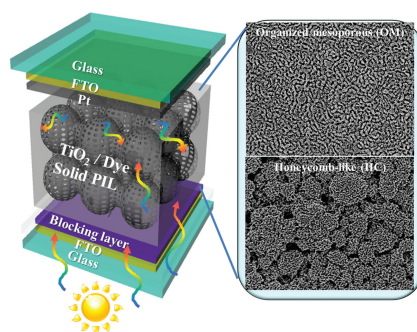


Light-Emitting Diodes

S.-Y. Kim, W.-I. Jeong, C. Mayr, Y.-S. Park, K.-H. Kim, J.-H. Lee, C.-K. Moon, W. Brütting, J.-J. Kim*3896–3900

Organic Light-Emitting Diodes with 30% External Quantum Efficiency Based on a Horizontally Oriented Emitter

Meso/macrosopic, honeycomb-like organized TiO₂ photoanodes with dual pores, high porosity, good interconnectivity, and excellent light scattering properties result in high efficiency solid-state dye-sensitized solar cells (7.4% at 100 mW/cm²). This value is one of the highest observed for N719 dye.



Solar Cells

S. H. Ahn, W. S. Chi, D. J. Kim, S. Y. Heo, J. H. Kim*3901–3908

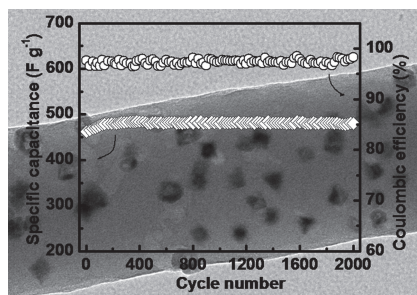
Honeycomb-Like Organized TiO₂ Photoanodes with Dual Pores for Solid-State Dye-Sensitized Solar Cells

FULL PAPERS

Capacitors

F. Zhang, C. Z. Yuan, J. J. Zhu, J. Wang,
X. G. Zhang,* X. W. Lou*.... 3909–3915

Flexible Films Derived from Electrospun Carbon Nanofibers Incorporated with Co_3O_4 Hollow Nanoparticles as Self-Supported Electrodes for Electrochemical Capacitors

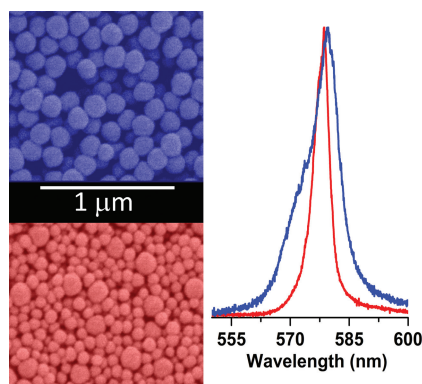


Flexible porous films derived from electrospun carbon nanofibers incorporated with Co_3O_4 hollow nanoparticles are efficiently fabricated and directly applied as advanced self-supported hybrid film electrodes. The exhibit very high specific capacitance and excellent electrochemical stability at high current densities.

Optically Active Materials

L. Cerdán,* A. Costela, E. Enciso,
I. García-Moreno 3916–3924

Random Lasing in Self-Assembled Dye-Doped Latex Nanoparticles: Packing Density Effects

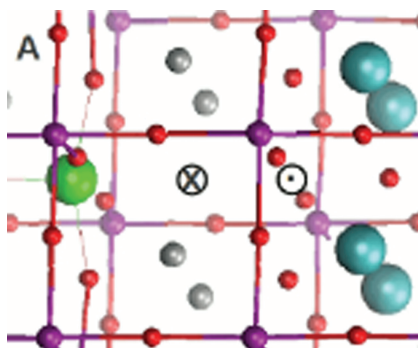


Efficient random lasing (RL) from self-assembled dye-doped latex nanoparticles presenting size polydispersity is reported. Both the nanoparticle size and size polydispersity influence the RL emission properties. The use of binary mixtures of nanoparticles with different sizes improves the RL emission properties with respect to the mixture constituents separately due to an increase in the filling fraction.

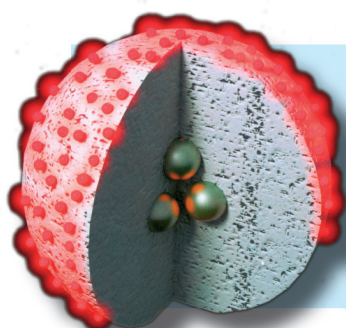
Semiconductors

C. L. Freeman,* J. A. Dawson,
H.-R. Chen, L. Ben, J. H. Harding,
F. D. Morrison, D. C. Sinclair,
A. R. West 3925–3928

Energetics of Donor-Doping, Metal Vacancies, and Oxygen-Loss in A-Site Rare-Earth-Doped BaTiO_3



The defect structure of 4% La-doped BaTiO_3 with 4 LaBa and a Ti vacancy is shown. The loss of Ti encourages the creation of an oxygen vacancy and the subsequent electron compensation creates Ti^{3+} , which generates the semiconducting behavior seen for these samples.



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FULL PAPER

Conducting Polymers

T. F. Otero,* M. Alfaro, V. Martinez,
M. A. Perez, J. G. Martinez3929–3940

**Biomimetic Structural Electrochemistry
from Conducting Polymers:
Processes, Charges, and Energies.
Coulvoltammetric Results from Films
on Metals Revisited**

Coulvoltammetric responses from films of conducting polymers coating metal electrodes allow a graphical separation, identification, and quantification of reversible and irreversible reactions; structural (shrinking, compaction, relaxation and swelling) components of the reversible film reaction; their potential domains; charges; and energies consumed by every structural process.

