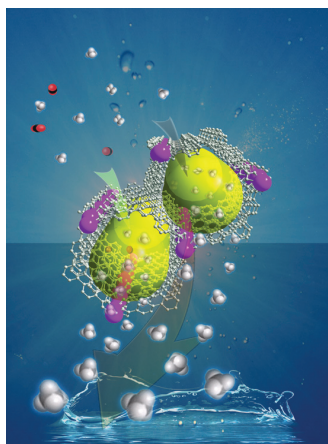


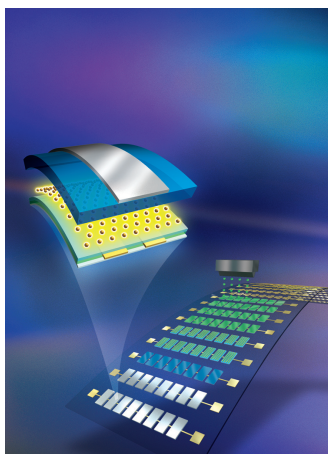
ADVANCED FUNCTIONAL MATERIALS

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Methane Separation

On page 3525, Susumu Kitagawa and co-workers demonstrate a new porous coordination polymer, in which the uniform 1D channel and open metal sites lead to excellent methane separation capability towards carbon dioxide and C2 hydrocarbons at ambient temperature. More importantly, its high water- and acid/alkaline-resistance properties will pave the way for practical use for methane purification in the future.

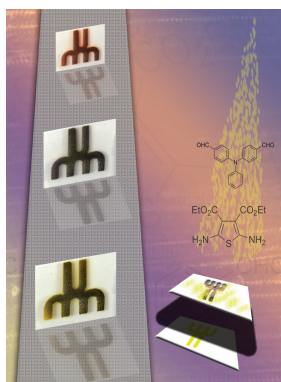


Organic Electronics

High-performance, top-gated, organic, nano-floating gate memory (NFGM) devices fabricated using spatially well-distributed metallic nanoparticles as a floating gate and dielectrics with long charge relaxation properties are reported by Kang-Jun Baeg, Yong-Young Noh, Dong-Yu Kim, and co-workers on page 3503. The organic NFGM devices show wide memory windows, a high on/off current ratio, and quasi-permanent retention characteristics. The 256-bit NFGM array is also fabricated successfully on a flexible polyethylene naphthalate (PEN) substrate.

Electrochromic Devices

Thermal polymerization of a conjugated polymer is performed directly on the device electrode using solution-processable monomers. On page 3549, W. G. Skene and co-workers report that the resulting immobilized polymer is electroactive and it is reversibly switched electrochromically between its colored states. The polymer is successfully used as the electrochromic layer in a working device with repeated color switching.



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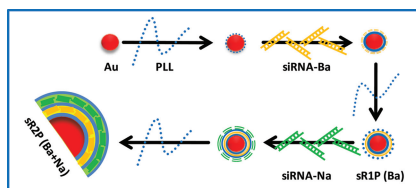
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FULL PAPERS

Gene Silencing

S. K. Lee, C.-H. Tung*3488–3493

A Fabricated siRNA Nanoparticle for Ultralong Gene Silencing In Vivo

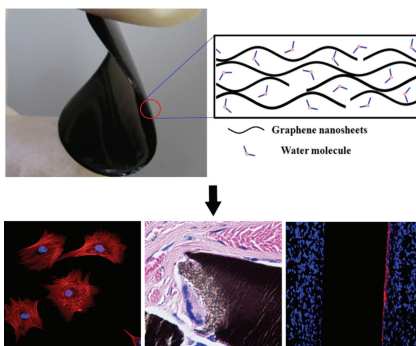


An ultralong siRNA gene silencing effect is achieved in cells and in animal using a functionalized siRNA nanoparticle that consists of multiple siRNA and degradable polypeptide layers. Due to the slow degradation through the layers, the particles continuously release siRNA and the in vivo gene silencing effect is consistent for more than 3 weeks with only a single treatment.

Hydrogels

J. Lu, Y.-S. He, C. Cheng, Y. Wang, L. Qiu, D. Li,* D. Zou*3494–3502

Self-Supporting Graphene Hydrogel Film as an Experimental Platform to Evaluate the Potential of Graphene for Bone Regeneration

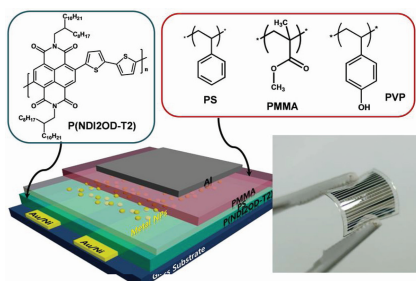


A self-supporting graphene hydrogel film prepared by a simple vacuum filtration technology is used as a unique experimental platform to study how graphene interacts with biological tissues both in vitro and in vivo. This graphene-based bulk material appears to be highly biocompatible, biodegradable, and osteoinductive, demonstrating graphene's potential for bone regenerative medicine.

Organic Electronics

M. Kang, K.-J. Baeg,* D. Kim, Y.-Y. Noh,* D.-Y. Kim*3503–3512

Printed, Flexible, Organic Nano-Floating-Gate Memory: Effects of Metal Nanoparticles and Blocking Dielectrics on Memory Characteristics

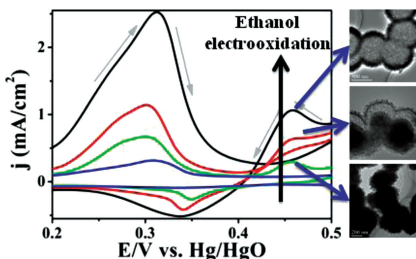


Highly stable top-gated organic nano-floating-gate memory (NFGM) devices with quasi-permanent retention characteristics are fabricated using an n-type conjugated polymer. The best polymer NFGM devices show excellent memory-related characteristics along with a wide memory window, a high on-off current ratio, and a long retention time.

Hollow Microspheres

M. F. Shao, F. Y. Ning, J. W. Zhao, M. Wei,* D. G. Evans, X. Duan 3513–3518

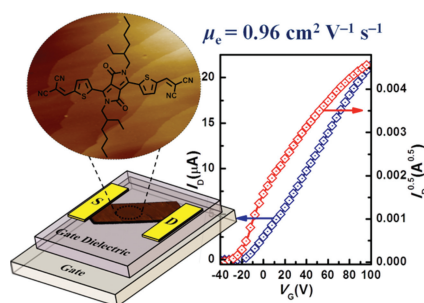
Hierarchical Layered Double Hydroxide Microspheres with Largely Enhanced Performance for Ethanol Electrooxidation



Hierarchical MgFe-layered double hydroxide (LDH) microspheres with tunable interior structure (hollow, yolk-shell, and solid) are synthesized by a facile and cost-effective surfactant-templated method. The resulting hollow LDH microspheres yields largely enhanced activity as well as robust durability towards ethanol electro-oxidation, owing to the significantly improved mass transport and faradaic redox reaction.

FULL PAPERS

A new dicyanovinyl-substituted diketopyrrolopyrrole (DPP)-based small molecule, DPP-T-DCV, shows outstanding electron mobility (μ_e) in solution-processed single-crystal OFETs (SC-OFETs). The molecular structure of DPP-T-DCV, SC-OFETs device structure, and atomic force microscopy images of the film surface of the DPP-T-DCV crystal device are shown. SC-OFETs exhibit μ_e as high as $0.96 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ with on/off current ratio of $\approx 10^5$.

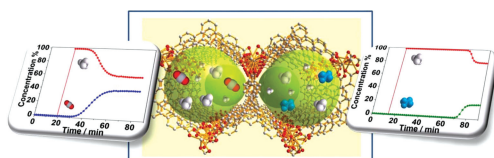


Transistors

W. S. Yoon, S. K. Park, I. Cho, J.-A. Oh, J. H. Kim, S. Y. Park* 3519–3524

High-Mobility n-Type Organic Transistors Based on a Crystallized Diketopyrrolopyrrole Derivative

A new porous coordination polymer, $[\text{La}(\text{BTB})\text{H}_2\text{O}] \cdot \text{solvent}$ (1Dguest), exhibits high CH_4 separation capability toward CO_2 and C2 hydrocarbons at room temperature. In particular, it shows good water and chemical stability and is stable at $\text{pH} = 14$ at 100°C .

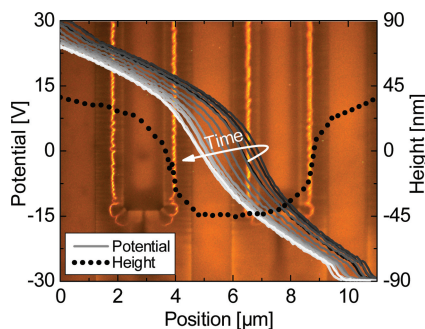


Porous Polymers

J. Duan, M. Higuchi, S. Horike, M. L. Foo, K. P. Rao, Y. Inubushi, T. Fukushima, S. Kitagawa*... 3525–3530

High CO_2/CH_4 and C2 Hydrocarbons/ CH_4 Selectivity in a Chemically Robust Porous Coordination Polymer

A combination of fluorescence and scanning Kelvin probe microscopy is used to gain insight into the operational mechanism of planar ionic transition metal complex-based light-emitting electrochemical cells. Quenching of the photoluminescence in the interelectrode gap in accord with a sharp potential drop far away from the electrodes confirm an electrochemical doping mechanism, which results in the formation of a light-emitting p-i-n junction.

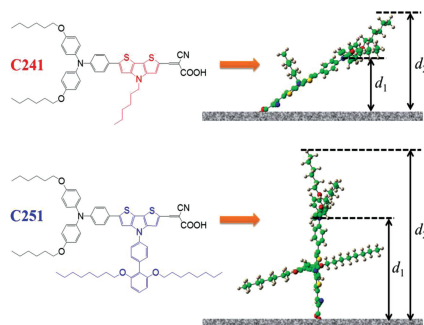


Electrochemistry

S. B. Meier, S. van Reenen, B. Lefevre, D. Hartmann, H. J. Bolink, A. Winnacker, W. Sarfert,* M. Kemerink* 3531–3538

Dynamic Doping in Planar Ionic Transition Metal Complex-Based Light-Emitting Electrochemical Cells

A high molar absorption coefficient dithienopyrrole dye featuring the 3D giant bis(octyloxy)biphenyl segment is synthesized and employed to fabricate a 9.3% dye-sensitized solar cell at the AM1.5G conditions. The solar cell exhibits a reduced interfacial charge recombination of photoinjected electrons with both tris(1,10-phenanthroline)cobalt(III) ions and dye cations, in comparison with its congener possessing the hexyl substituent.



Solar Cells

N. Cai, J. Zhang, M. Xu, M. Zhang,* P. Wang* 3539–3547

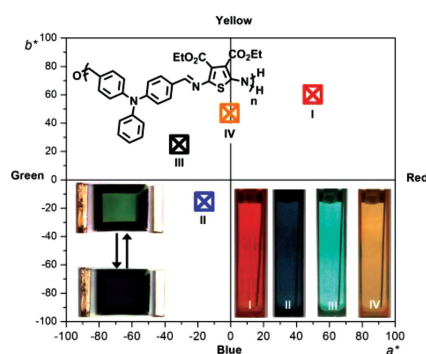
Improving the Photovoltage of Dithienopyrrole Dye-Sensitized Solar Cells via Attaching the Bulky Bis(octyloxy)biphenyl Moiety to the Conjugated π -Linker

FULL PAPERS

Conjugated Materials

L. Sicard, D. Navarathne, T. Skalski,
W. G. Skene*3549–3559

**On-Substrate Preparation of
an Electroactive Conjugated
Polyazomethine from Solution-
Processable Monomers and its
Application in Electrochromic Devices**



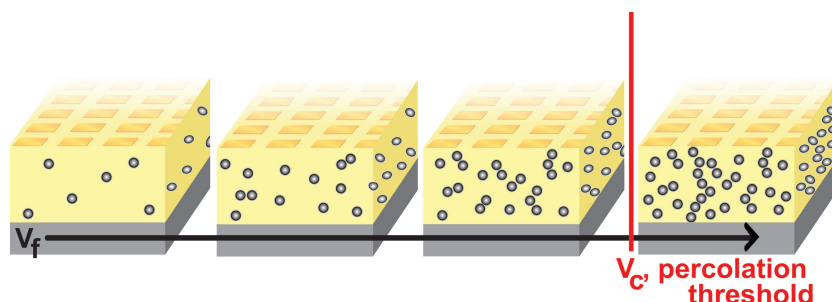
Thermal polymerization of a conjugated polymer is performed directly on the device electrode using solution-processable monomers. The resulting immobilized polymer is electroactive and it is reversibly switched electrochromically between its colored states. The polymer is successfully used as the electrochromic layer in a working device with repeated color switching.

Composite Materials

L. A. Fredin, Z. Li, M. T. Lanagan,*
M. A. Ratner,* T. J. Marks*3560–3569

**Substantial Recoverable Energy Storage
in Percolative Metallic Aluminum-
Polypropylene Nanocomposites**

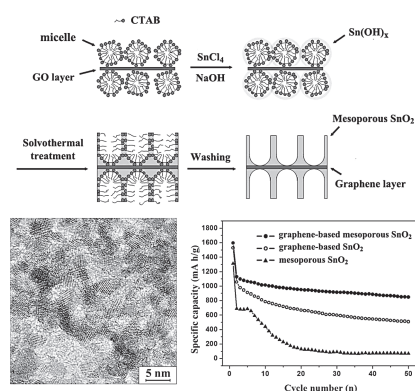
Al-polypropylene nanocomposites are promising pulse-power capacitor materials, with resistivities of $\approx 10^{12}$ – 10^{15} Ω -cm, low dielectric loss in the 100 Hz–1 MHz frequency range, and recoverable energy storage as high as 14.4 J/cm³. These conductive-insulator composites obey the percolation law for two-phase composites, reaching maximum permittivity values, ϵ_r , as high as 15.4 before the percolation threshold volume fraction, $\nu_f = 0.16$.



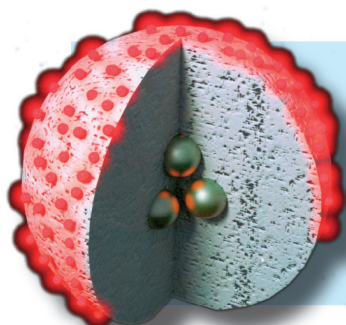
Batteries

S. Yang, W. B. Yue,* J. Zhu, Y. Ren,
X. J. Yang*3570–3576

**Graphene-Based Mesoporous SnO₂
with Enhanced Electrochemical
Performance for Lithium-Ion Batteries**



A graphene-based mesoporous SnO₂ composite is prepared via in situ growth of mesoporous SnO₂ on the graphene surface using cetyltrimethylammonium bromide (CTAB) as a template. Because of the high specific surface area and stable mesostructure of SnO₂ nanocrystalline on graphene, it displays higher reversible capacity, better cycle performance, and better rate capability compared to mesoporous SnO₂ and graphene-based non-porous SnO₂.



How to contact us:

Editorial Office:

Phone: (+49) 6201-606-286/531
Fax: (+49) 6201-606-500
Email: afm@wiley-vch.de

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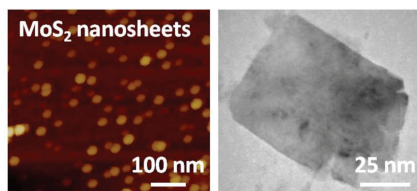
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FULL PAPERS

The lack of a reliable large-scale production method inhibits practical applications of MoS₂ nanosheets. To address this, a facile, efficient, and scalable method for the fabrication of high-concentration aqueous dispersion of MoS₂ nanosheets using combined grinding and sonication is developed. The exfoliation process establishes a new paradigm in the top-down fabrication of 2D nanosheets in aqueous solution.

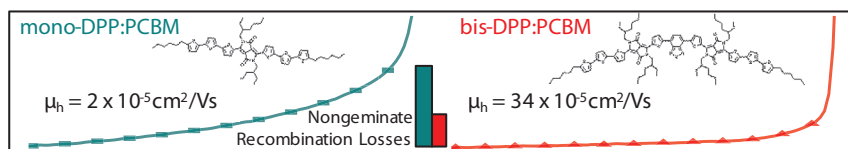


Nanosheets

Y. G. Yao,* L. Tolentino, Z. Z. Yang,
X. J. Song, W. Zhang, Y. S. Chen,
C.-p. Wong* 3577–3583

High-Concentration Aqueous Dispersions of MoS₂

Charge transport and voltage-dependent recombination losses are studied in two diketopyrrolopyrrole (DPP)-based solution-processed small molecule bulk heterojunction solar cells. Light intensity and impedance spectroscopy measurements probe the influence of nongeminate recombination losses in both systems. Further analysis suggests the increase in fill factor observed in the bis-DPP system is a direct result of the higher hole mobility.



Organic Electronics

C. M. Proctor, C. Kim, D. Neher,
T.-Q. Nguyen* 3584–3594

Nongeminate Recombination and Charge Transport Limitations in Diketopyrrolopyrrole-Based Solution-Processed Small Molecule Solar Cells