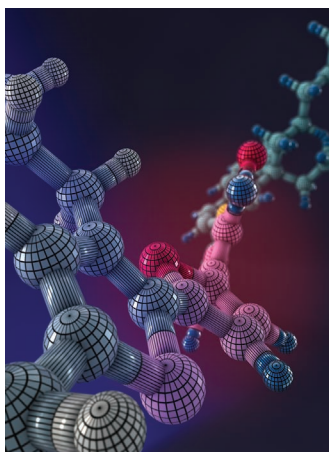


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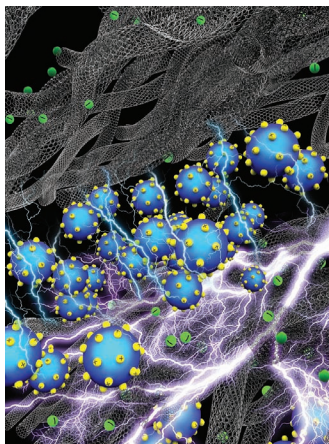


Conjugated Polymers

Fully conjugated block copolymers with donor and acceptor polymer blocks can function as the active layer of an organic photovoltaic device. On page 5578, R. Verduzco and co-workers demonstrate that the linking group at the donor-acceptor junction is critical for charge separation. Proper design of the linking group is essential for producing viable block copolymer photovoltaic devices.

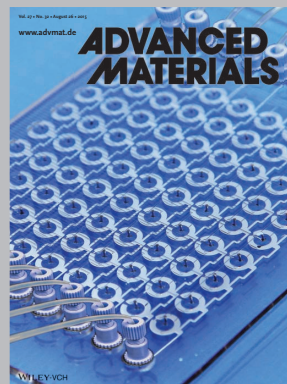
Flexible Electronics

A biocompatible and biodegradable memory device is presented for future medical devices and implantable electronics. J.-S. Lee and co-workers develop nonvolatile memory devices based on natural materials with simple solution processes on page 5586. The memory devices are decomposed entirely during immersion in water. The fabricated device is fully biocompatible and environmentally benign, with good programmable memory characteristics.



Lithium-Ion Batteries

A layer-by-layer nano-architecture is successfully fabricated for use as a cathode, via electrostatic interaction and vacuum filtration of positively charged V_2O_5 nanospheres and negative-charge-terminated multiwalled carbon nanotube (MWCNT). As shown by K. Huang, J. X. Zhong, and co-workers on page 5633, the V_2O_5 nanospheres are closely intercalated between the MWCNT layers, minimizing the disadvantageous voids, and enhancing the overall conductivity of the composite electrode.



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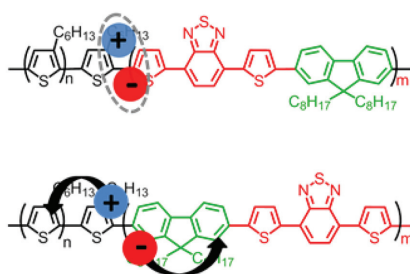
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FULL PAPERS

All-conjugated block copolymers have significant potential for use in photovoltaic active layers, but the role of the linking group between donor and acceptor blocks is poorly understood. An analysis of linking group chemistry is presented, revealing that proper design of the linking group is essential for producing viable block copolymer photovoltaic devices.

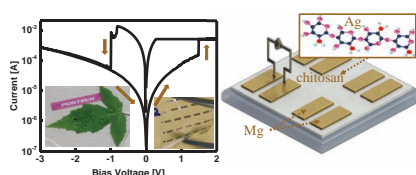


Conjugated Polymers

J. W. Mok, Y.-H. Lin, K. G. Yager, A. D. Mohite, W. Nie, S. B. Darling, Y. Lee, E. Gomez, D. Gosztola, R. D. Schaller, R. Verduzco*...5578–5585

Linking Group Influences Charge Separation and Recombination in All-Conjugated Block Copolymer Photovoltaics

A transparent and flexible resistive switching memory is fabricated using a natural organic polymer by solution processes. The proposed memory device is based on naturally abundant polymers with a coplanar structure of Mg/Ag-doped chitosan/Mg. The biocompatible and biodegradable memory device shows promising nonvolatile characteristics as a candidate for the next generation of flexible memory applications.

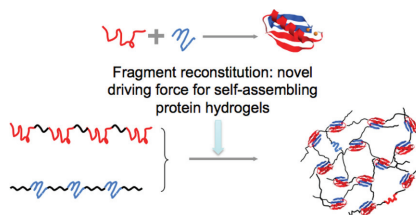


Flexible Electronics

N. Raeis Hosseini, J.-S. Lee*...5586–5592

Biocompatible and Flexible Chitosan-Based Resistive Switching Memory with Magnesium Electrodes

Reversible self-assembling protein hydrogels from protein fragment reconstitution: using protein fragment reconstitution as a novel driving force for crosslinking, reversible self-assembling protein hydrogels are engineered. These novel protein hydrogels are responsive to temperature and exhibit superb stability against erosion in excess buffer.

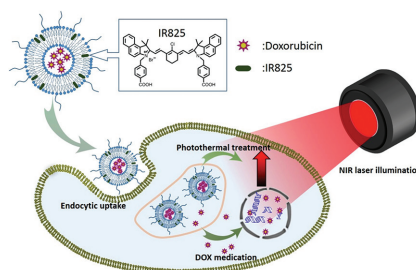


Protein Hydrogels

N. Kong, H. Li*...5593–5601

Protein Fragment Reconstitution as a Driving Force for Self-Assembling Reversible Protein Hydrogels

NIR light-absorptive stealth liposomes are developed by incorporating an NIR-absorptive heptamethine indocyanine dye IR825 into thermoresponsive liposomes, which can be further loaded with doxorubicin for photothermal/chemo combined cancer therapy in vivo.



Photothermal Therapy

M. Li, C. Teh, C. Y. Ang, S. Y. Tan, Z. Luo, Q. Qu, Y. Zhang, V. Korzh, Y. Zhao*...5602–5610

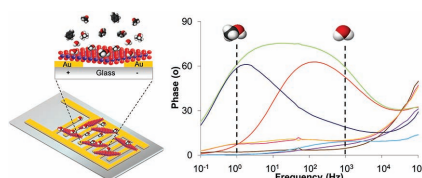
Near-Infrared Light-Absorptive Stealth Liposomes for Localized Photothermal Ablation of Tumors Combined with Chemotherapy

FULL PAPERS

Vapor Sensing

C. C. Mayorga-Martinez,
A. Ambrosi, A. Y. S. Eng,
Z. Sofer, M. Pumera* 5611–5616

Metallic 1T-WS₂ for Selective Impedimetric Vapor Sensing



The impedance phase spectra of metallic 1T-WS₂ present specific resonant frequencies for methanol and water vapors, meaning that using the same 1T-WS₂ platform is possible to detect methanol and water vapors by selecting specific frequencies (1 Hz for methanol and 1 kHz for water).

Broadband Upconversion

A. Monguzzi,* S. Borisov, J. Pedrini,
I. Klimant, M. Salvalaggio, P. Biagini,
F. Melchiorre, C. Lelii,
F. Meinardi* 5617–5624

Efficient Broadband Triplet–Triplet Annihilation-Assisted Photon Upconversion at Subsolar Irradiance in Fully Organic Systems

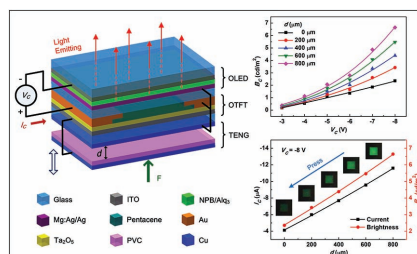


Broadband triplet–triplet annihilation-assisted photon upconversion is demonstrated at subsolar irradiance by the simultaneous use of several light harvesters. An unprecedented yield of 10% is obtained under air mass (AM) 1.5 conditions in a fully organic system, which allows a dye-sensitized solar cell device to operate by exploiting exclusively sub-bandgap photons.

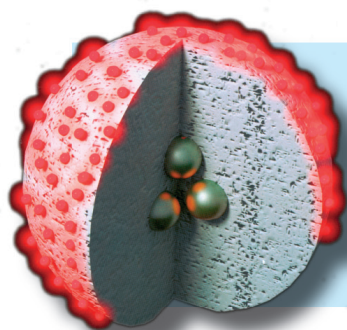
Tribophototronics

C. Zhang, J. Li, C. B. Han, L. M. Zhang,
X. Y. Chen, L. D. Wang, G. F. Dong,*
Z. L. Wang* 5625–5632

Organic Tribotronic Transistor for Contact-Electrification-Gated Light-Emitting Diode



An organic tribotronic transistor and a contact-electrification-gated light-emitting diode (CG-LED) are proposed, in which the operating current and light-emission intensity can be tuned/controlled by an external force-induced contact electrification. Different from the conventional organic light-emitting transistor controlled by an electrical signal, the CG-LED can realize the direct interaction between the external environment/stimuli and the electroluminescence device.



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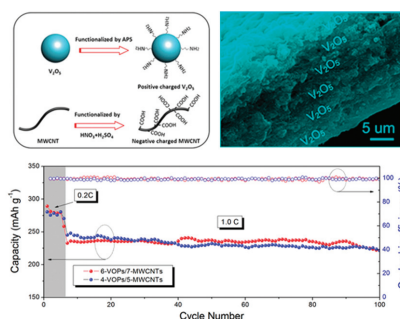
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FULL PAPERS

A layer-by-layer nanoarchitecture as cathode is successfully fabricated, assembled by alternating the positively charged V_2O_5 nanospheres and the negatively charged terminated multiwalled carbon nanotube (MWCNT) solutions. The V_2O_5 nanospheres are closely intercalated between the adjacent MWCNT layers, minimizing disadvantageous voids and improving overall conductivity, leading to an enhanced cycling durability as well as improved rate capability.

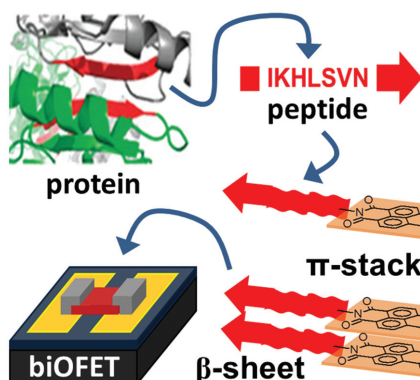


Lithium-Ion Batteries

B. Sun, K. Huang,* X. Qi, X. Wei, J. X. Zhong*5633–5639

Rational Construction of a Functionalized V_2O_5 Nanosphere/MWCNT Layer-by-Layer Nanoarchitecture as Cathode for Enhanced Performance of Lithium-Ion Batteries

Natural aggregating peptide sequences are used as tectons to assemble organic semiconducting molecules. An 8-mer peptide derived from inspection of protein–protein interfaces in the peroxiredoxin family is attached in various modes to perylene imides. Self-assembling hybrid materials with strong electronic coupling and long-range order are created, culminating with the fabrication of a bio-organic field-effect transistor device.

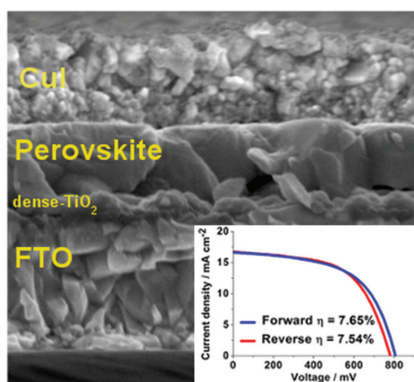


Organic Semiconductors

G. L. Eakins, R. Pandey, J. P. Wojciechowski, H. Y. Zheng, J. E. A. Webb, C. Valéry, P. Thordarson, N. O. V. Plank, J. A. Gerrard, J. M. Hodgkiss*5640–5649

Functional Organic Semiconductors Assembled via Natural Aggregating Peptides

Planar perovskite/copper(I) iodide solar cells with near to no J – V hysteresis, made by employing thin CuI and perovskite layers, result in a record conversion efficiency of 7.5%. The magnitude of dielectric polarization at the perovskite/hole-conductor interface is proposed to influence the degree of J – V hysteresis.

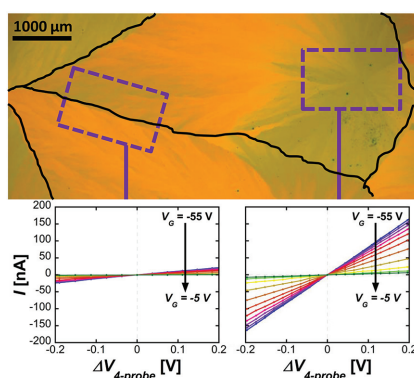


Perovskite Solar Cells

G. A. Sepalage, S. Meyer, A. Pascoe, A. D. Scully, F. Huang, U. Bach, Y.-B. Cheng, L. Spiccia*5650–5661

Copper(I) Iodide as Hole-Conductor in Planar Perovskite Solar Cells: Probing the Origin of J – V Hysteresis

The impact of interspherulite boundaries (ISBs) on charge transport in organic semiconductor thin films is explored using gated four-probe transistor measurements on triethylsilyl ethynyl anthradithiophene (TES ADT). Quantification of the densities and energy levels of shallow traps at these boundaries suggests TES ADT's ISBs to be akin to the connected boundaries between crystallites in polymer semiconductor thin films.



Organic Electronics

A. K. Hailey, S.-Y. Wang, Y. Chen, M. M. Payne, J. E. Anthony, V. Podzorov, Y.-L. Loo*5662–5668

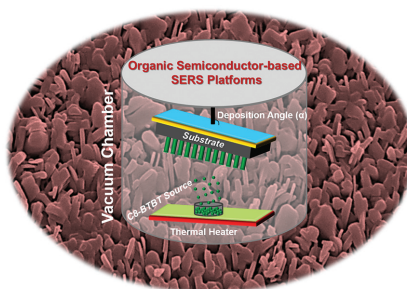
Quantifying the Energy Barriers and Elucidating the Charge Transport Mechanisms across Interspherulite Boundaries in Solution-Processed Organic Semiconductor Thin Films

FULL PAPERS

Nanostructured Films

M. Yilmaz, M. Ozdemir, H. Erdogan,
U. Tamer, U. Sen, A. Facchetti,*
H. Usta,* G. Demirel* 5669–5676

Micro-/Nanostructured Highly Crystalline Organic Semiconductor Films for Surface-Enhanced Raman Spectroscopy Applications

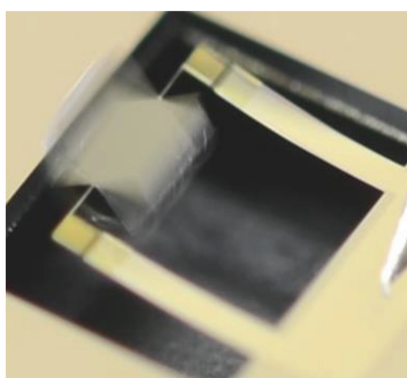


A simple and versatile approach for the fabrication of novel surface-enhanced Raman spectroscopy (SERS) platforms based on vertically oriented micro-/nanostructured 2,7-dioctyl[1]benzothieno[3,2-b][1]benzothiophene (C8-BTBT) films via an oblique-angle vapor deposition is demonstrated. Remarkable SERS responses are achieved demonstrating the first example of a π -conjugated small-molecule based SERS platform with excellent detection characteristics. Our results indicate that organic semiconductors hold great promise for future SERS applications.

Metallic Glass

Y.-C. Lin,* Y.-C. Tsai,* T. Ono,
P. Liu, M. Esashi, T. Gessner,
M. Chen 5677–5682

Metallic Glass as a Mechanical Material for Microscanners

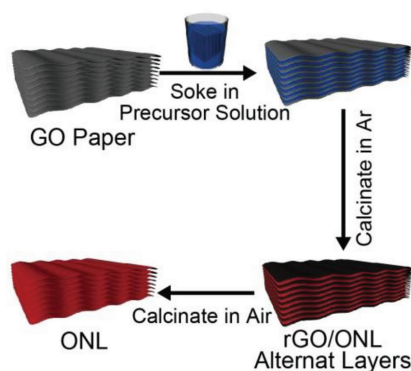


A metallic glass-based microscanner exhibits, for the first time, an ultralarge rotating angle of 146° with power consumption lowered to the microwatt range, as well as a smaller driving force and better actuation performance than conventional single crystal silicon and polycrystalline silicon. This development opens a new field of low-powered micro-electromechanical systems with extreme actuation and enhanced sensing.

Graphene Templates

Y. Saito, X. Luo, C. Zhao, W. Pan,*
C. Chen, J. Gong, H. Matsumoto,
J. Yao, H. Wu* 5683–5690

Filling the Gaps between Graphene Oxide: A General Strategy toward Nanolayered Oxides

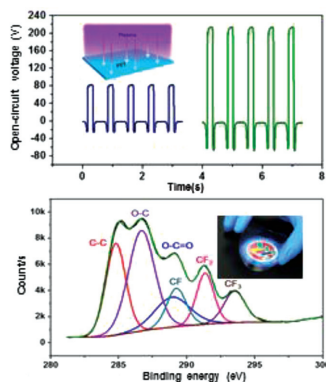


Graphene oxide (GO) provides an ideal 2D space which offers opportunity to confine a chemical reaction. By combining GO gap and sol-gel synthesis, 2D oxide nanolayers are successfully synthesized for a variety of metal oxides that do not naturally have layer molecular architecture.

Energy Conversion

H. Y. Li, L. Su, S. Y. Kuang, C. F. Pan,
G. Zhu,* Z. L. Wang 5691–5697

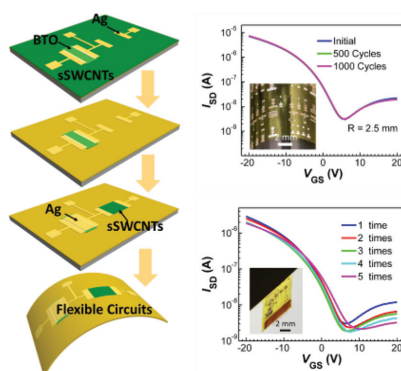
Significant Enhancement of Triboelectric Charge Density by Fluorinated Surface Modification in Nanoscale for Converting Mechanical Energy



An effective, general, straightforward, and area-scalable approach to surface modification of a polyethylene terephthalate (PET) film is developed via inductive-coupled plasma etching. The modification significantly promotes triboelectric property of the PET, making it a superior material for fabricating high-performance triboelectric nanogenerators. Chemical fluorination and physical bombardment both play vitally important roles in the modification.

FULL PAPERS

Carbon nanotube thin film transistors and integrated logic gates with tunable performance are fabricated on an ultrathin polyimide substrate by an inkjet-like printing process. Thanks to the excellent flexibility of the hybrid dielectric layer, the devices can survive thousands of bending cycles with curvature radii down to 1 mm and very aggressive folding tests.

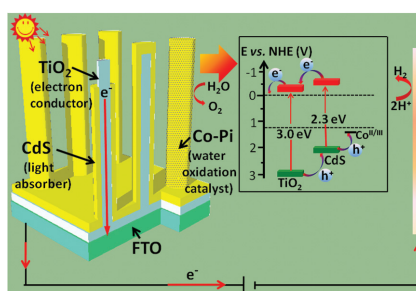


Flexible Electronics

L. Cai, S. M. Zhang, J. S. Miao, Z. B. Yu, C. Wang*5698–5705

Fully Printed Foldable Integrated Logic Gates with Tunable Performance Using Semiconducting Carbon Nanotubes

A **smart hybridization paradigm** is proposed by hierarchically assembling CdS shell and Co–Pi electrocatalyst on vertically aligned TiO₂ nanowires, aiming to simultaneously enhance the light absorption, charge separation/transport, and surface water oxidation reaction for solar water splitting. The multifunctional heterostructure delivers superior photoelectrochemical conversion efficiency and stability in nonsacrificial electrolyte, thus casting new light on developing advanced photoelectrochemical cell.



Water Splitting

G. Ai, H. Li,* S. Liu, R. Mo, J. Zhong*5706–5713

Solar Water Splitting by TiO₂/CdS/Co–Pi Nanowire Array Photoanode Enhanced with Co–Pi as Hole Transfer Relay and CdS as Light Absorber

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