ADVANCED FUNCTIONAL MATERIALS

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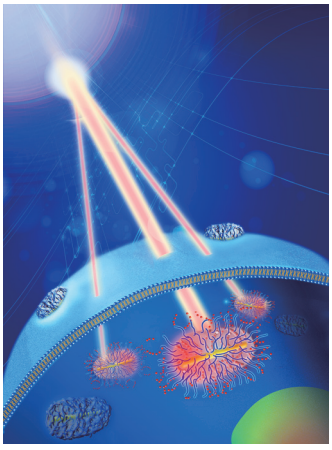
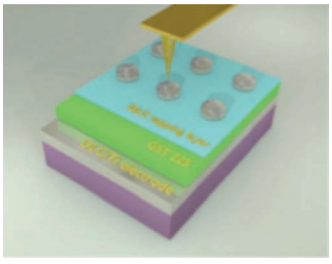


Nanocarriers

On page 2255, Bo Tang and co-workers report a method to construct near-infrared light-triggered nanocarriers with reversible valves. The release amounts of the cargo molecules can be controlled precisely by adjusting the irradiation time and the laser on-off cycles. The therapeutic effect toward cancer cells can also be regulated when doxorubicin is loaded into the nanocarrier.

Stimuli-Responsive Materials

The multistep folding of stimuli-responsive polymer films with different shapes is demonstrated by Leonid Ionov and co-workers on page 2295. It is observed that deformed shapes differ from the classical ones, such as tubes or flowers, and one can introduce sharp hinges into the folded structure by the proper design of the bilayer's shape. Experimental observations lead to the derivation of empirical folding rules. It is then demonstrated how those rules can be used to direct the folding of edge-activated polymer bilayers.



Phase Change Computing

On page 2248, C. David Wright and co-workers show that nanometer-scale GeSbTe phase-change memory type devices provide an efficient and effective route to computing. Processing and storage are carried out simultaneously and at the same physical location, thus circumventing the von Neumann "bottleneck". Advanced processing, including factorization and fractional division, is demonstrated.

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A. Tkach,* P. M. Vilarinho,* W. Kleemann, V. V. Shvartsman, P. Borisov, S. Bedanta 2229–2230

Comment on "The Origin of Magnetism in Mn-Doped $SrTiO_3$"

M. Valant,* T. Kolodiazhnyi, I. Arčon, F. Aguesse, A.-K. Axelsson, N. M. Alford 2231–2232

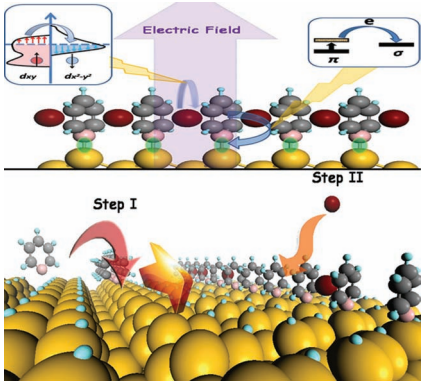
Response to "Comment on 'The Origin of Magnetism in Mn-Doped $SrTiO_3$'"

FULL PAPERS

Molecular Electronics

Y. H. Lu,* H. Jin, H. Zhu, S.-W. Yang,* C. Zhang, J. Z. Jiang, Y. P. Feng 2233–2238

A Possible Reaction Pathway to Fabricate a Half-Metallic Wire on a Silicon Surface

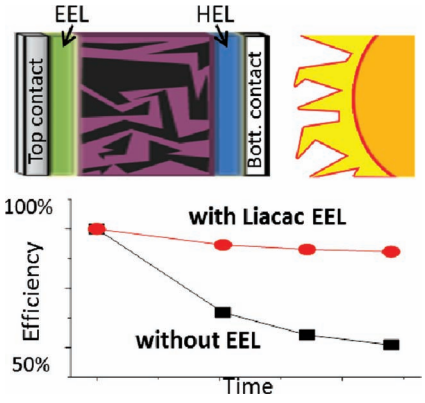


A possible way to fabricate a half-metallic sandwich molecular wire on a silicon surface is proposed using first-principle calculations. The magnetic state of this molecular wire is sensitive to the electric field and can be changed between two states. The hybrid system has very promising application in emerging molecular electronic or spintronic devices.

Organic Solar Cells

G. Williams, Q. Wang, H. Aziz* 2239–2247

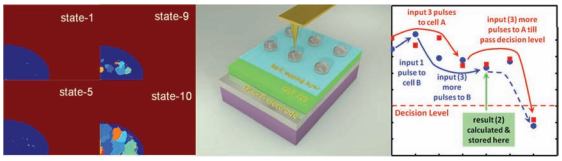
The Photo-Stability of Polymer Solar Cells: Contact Photo-Degradation and the Benefits of Interfacial Layers



Exposure of organic solar cells (OSCs) to light results in degradation in all OSC parameters, even in inert environments. The use of electron extraction layers (EELs) in between the organic layer and an Al layer can largely suppress contact photo-degradation and enhance OSC photo-stability. Lithium acetylacetonate, as a new EEL material, provides efficiency improvement on par with the ubiquitous LiF, but with some additional stability improvement.

FULL PAPERS

Nanometer-scale GeSbTe phase-change memory type devices are shown to provide an efficient and effective route to computing in which processing and storage are carried out simultaneously and at the same physical location, circumventing the "von Neumann bottleneck". Advanced processing including factorization and fractional division are demonstrated, with single GeSbTe cells performing computations that require around 100 transistors in conventional Si processors.

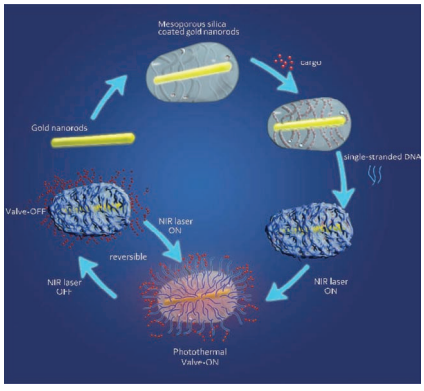


Phase-Change Materials

C. D. Wright,* P. Hosseini, J. A. Vazquez Diosdado 2248–2254

Beyond von-Neumann Computing with Nanoscale Phase-Change Memory Devices

A novel near-infrared light-triggered nanocarrier is developed based on mesoporous silica-coated gold nanorods with reversible DNA valves. The release amount of the cargo molecules can be controlled precisely by adjusting the irradiation time and the laser on-off cycles. The controlled release can be accomplished in living cells. Moreover, the therapeutic effect toward cancer cells can also be regulated.

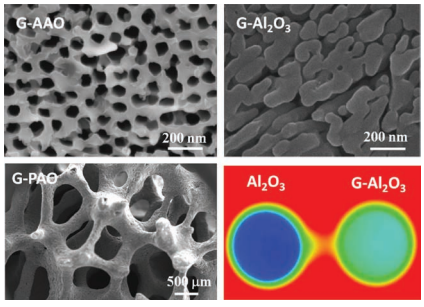


Drug Delivery

N. Li, Z. Yu, W. Pan, Y. Han, T. Zhang, B. Tang*.....2255–2262

A Near-Infrared Light-Triggered Nanocarrier with Reversible DNA Valves for Intracellular Controlled Release

A novel architecture of 3D graphene is proposed by direct growth on porous Al_2O_3 ceramics by using chemical vapor deposition. The graphene/Al_2O_3 composite provides enormous conductive pathways for electron and phonon transport, suitable for application as a heat sink. Furthermore, the composite acts as a new type of highly thermally conductive reservoir to accommodate phase change materials for thermal energy storage.

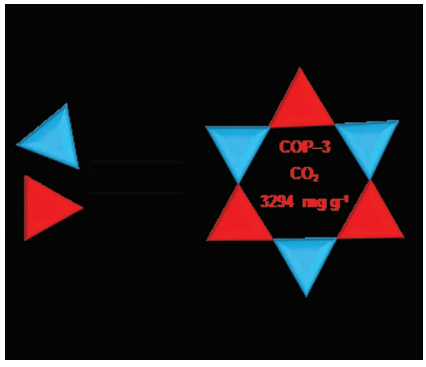


Graphene

M. Zhou, T. Lin, F. Huang,* Y. Zhong, Z. Wang, Y. Tang, H. Bi, D. Wan, J. Lin* 2263–2269

Highly Conductive Porous Graphene/Ceramic Composites for Heat Transfer and Thermal Energy Storage

A robust, one pot synthesis of sulfur and nitrogen rich covalent organic polymers (COPs) leads to porous network polymers with exceptional CO_2 capture capacities, water stability, and selectivity of CO_2 over N_2. COPs require multidentate cores and linkers to form permanent micropores, a desired feature for gas capture and separation.



Porous Polymers

H. A. Patel, F. Karadas, J. Byun, J. Park, E. Deniz, A. Canlier, Y. Jung,* M. Atilhan,* C. T. Yavuz*.....2270–2276

Highly Stable Nanoporous Sulfur-Bridged Covalent Organic Polymers for Carbon Dioxide Removal

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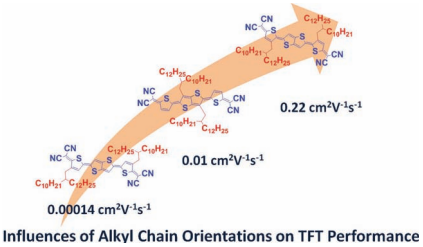
FULL PAPERS

Organic Semiconductors

Q. Wu, S. Ren, M. Wang, X. Qiao, H. Li,* X. Gao, X. Yang, D. Zhu* 2277–2284

Alkyl Chain Orientations in Dicyanomethylene-Substituted 2,5-Di(thiophen-2-yl)thieno-[3,2-b] thienoquinoid: Impact on Solid-State and Thin-Film Transistor Performance



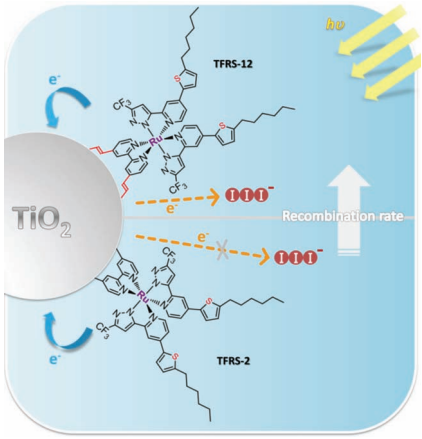
Influences of Alkyl Chain Orientations on TFT Performance

N-type organic semiconductors with different alkyl chain orientations are strategically designed and synthesized. Experimental results show that the orientations of alkyl chains strongly affect the charge transport property and molecular packing of organic semiconductors.

Solar Cells

K.-L. Wu, W.-P. Ku, S.-W. Wang, A. Yella, Y. Chi,* S.-H. Liu, P.-T. Chou,* M. K. Nazeeruddin,* M. Grätzel*.....2285–2294

Thiocyanate-Free Ru(II) Sensitizers with a 4,4′-Dicarboxyvinyl-2,2′-bipyridine Anchor for Dye-Sensitized Solar Cells

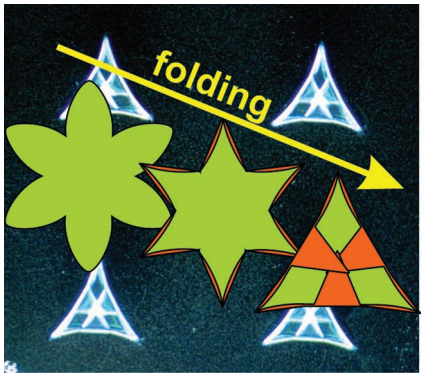


A new class of thiocyanate-free Ru(II) sensitizers with 4,4′-dicarboxyvinyl-2,2′-bipyridine anchors are synthesized and used in dye-sensitized solar cells (DSCs). The DSCs are investigated via current–voltage characteristics, incident photon-to-current conversion efficiency (IPCE), impedance spectra, as well as transient photocurrent and photovoltage decay measurements.

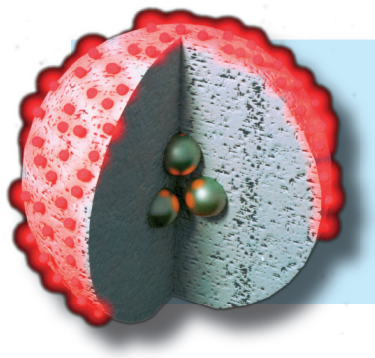
Self-Assembly

G. Stoychev, S. Turcaud, J. W. C. Dunlop, L. Ionov* ...2295–2300

Hierarchical Multi-Step Folding of Polymer Bilayers



Highly complex multi-step folding of isotropic stimuli-responsive polymer bilayers results in a variety of 2D and 3D structures. Experimental observations allow determination of empirical rules, which can be used to direct the folding of polymer films in a predictable manner.



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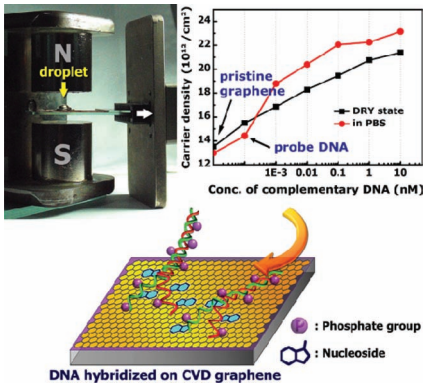
FULL PAPERS

Label-free, single-base sequence selective detection of DNA hybridization based on a single-layer graphene device is investigated using Hall effect measurements with the Van der Pauw method. The increase in hole carrier density, indicating p-doping to graphene, is better correlated to the DNA hybridization compared with the commonly used parameters such as conductivity change.

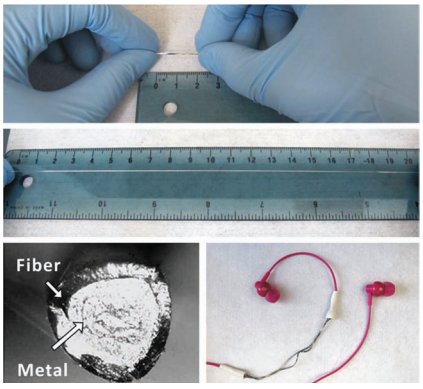


Biosensors

C.-T. Lin, P. T. K. Loan, T.-Y. Chen, K.-K. Liu, C.-H. Chen, K.-H. Wei,* L.-J. Li* 2301–2307

Label-Free Electrical Detection of DNA Hybridization on Graphene using Hall Effect Measurements: Revisiting the Sensing Mechanism

The fabrication and characterization of fibers that are ultrastretchable and have metallic electrical conductivity are described. The fibers consist of a liquid metal alloy, eutectic gallium indium (EGaIn), injected into the core of stretchable hollow fibers composed of a triblock copolymer, poly[styrene-b-(ethylene-*co*-butylene)-*b*-styrene] (SEBS) resin. The hollow fibers are easy to mass-produce with controlled size by using commercially available melt processing methods.

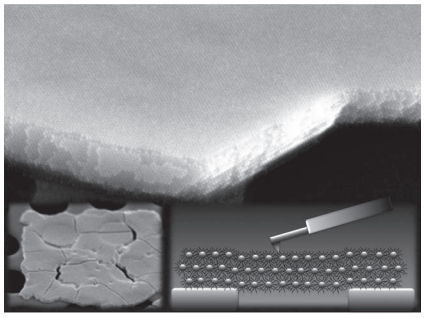


Stretchable Electronics

S. Zhu, J.-H. So, R. Mays, S. Desai, W. R. Barnes, B. Pourdeyhimi, M. D. Dickey* 2308–2314

Ultrastretchable Fibers with Metallic Conductivity Using a Liquid Metal Alloy Core

Three-dimensional colloidal arrays of nanocrystals, called supracrystals, are expected to be robust materials with Young's moduli (*E*) of several gigapascals. The characterization of soft supracrystal films with *E* of 100–200 MPa is reported. Two different models are used to determine the Young's modulus and both confirm this result independently. Further studies reveal that the mechanical properties of supracrystals are tuned by the growth mechanism.

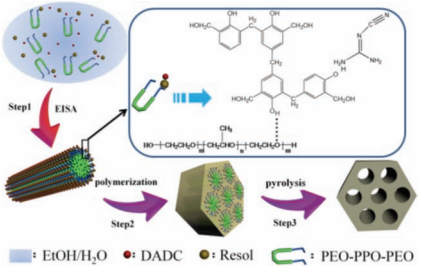


Gold Nanocrystals

C. Yan, I. Arfaoui, N. Goubet, M.-P. Pileni*.....2315–2321

Soft Supracrystals of Au Nanocrystals with Tunable Mechanical Properties

A facile and controllable synthesis method for producing ordered mesoporous carbon with high surface area and high nitrogen content is demonstrated. The approach uses soluble resol and dicyandiamide as the carbon and nitrogen source, respectively, and Pluronic F127 copolymer as a soft template via a solvent evaporation-induced self-assembly process.



Mesoporous Materials

J. Wei, D. D. Zhou, Z. K. Sun, Y. H. Deng,* Y. Y. Xia, D. Y. Zhao*.....2322–2328

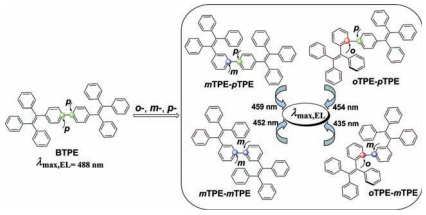
A Controllable Synthesis of Rich Nitrogen-Doped Ordered Mesoporous Carbon for CO_2 Capture and Supercapacitors

FULL PAPER

Light-Emitting Diodes

J. Huang, N. Sun, Y. Dong, R. Tang, P. Lu, P. Cai, Q. Li, D. Ma,* J. Qin, Z. Li*.....2329–2337

Similar or Totally Different: The Control of Conjugation Degree through Minor Structural Modifications, and Deep-Blue Aggregation-Induced Emission Luminogens for Non-Doped OLEDs



Four 4,4′-bis(1,2,2-triphenylvinyl)biphenyl (BTPE) derivatives are successfully synthesized and used as emitters for the construction of non-doped deep-blue organic light-emitting diodes (OLEDs). By merging two simple tetraphenylethene (TPE) moieties through *ortho-*, *meta-*, or *para-* linkage positions, the conjugation length is effectively controlled to ensure deep-blue emission, compared to BTPE which has sky-blue emission.