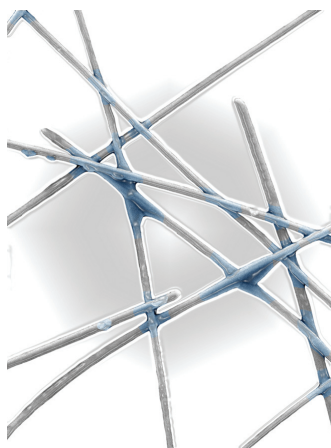


ADVANCED FUNCTIONAL MATERIALS

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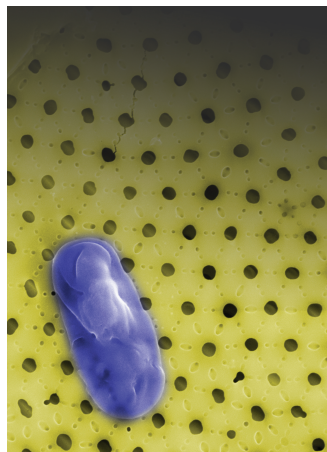


Silver Nanowires

D. Lee, S. H. Ko, and co-workers develop an alternative to rigid ITO transparent conductors. On page 4171, conducting polymer-assisted nano-soldering of Ag nanowires allows them to develop nanowire percolation networks, which form highly flexible and stretchable transparent conductors. A large area transparent conductor and a flexible touch panel on a non-flat surface are fabricated, demonstrating the possibility of cost-effective mass production as well as the applicability of these networks to unconventional, non-flat surfaces.

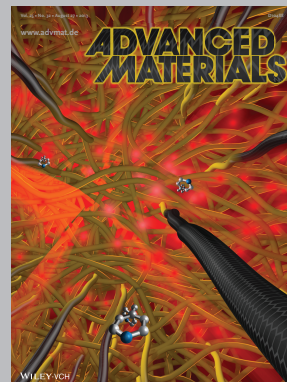
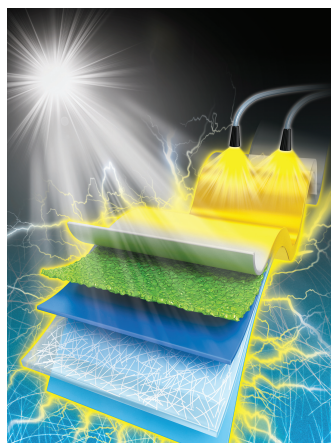
Biomimetics

On page 4236, bio-inorganic composite materials are functionalized under benign reaction conditions by R. R. Naik and co-workers. The nitrogen moieties associated with the biopolymers within the composite are chlorinated to yield halamine compounds. Bacterial spores are localized on the surfaces of these chlorinated *Coscinodiscus granii* frustules, and then the release of oxidizing halogens from their surfaces is capable of killing bacteria and inactivating the spores.



Organic Solar Cells

J. H. Park, J.-W. Kang, and co-workers report a highly bendable and efficient organic solar cell. On page 4177, it is created using solution-processed metal nanowire electrodes on top of a plastic substrate. The solar cell device exhibits a high power-conversion efficiency and outstanding mechanical bending characteristics.



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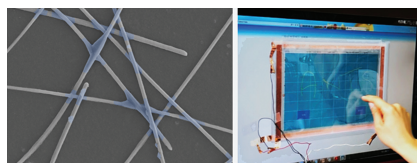
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FULL PAPERS

Silver Nanowires

J. Lee, P. Lee, H. B. Lee, S. Hong,
I. Lee, J. Yeo, S. S. Lee, T.-S. Kim,
D. Lee,* S. H. Ko*4171–4176



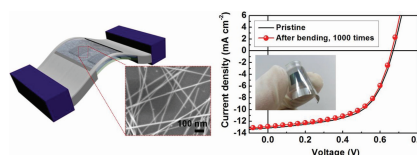
Room-Temperature Nanosoldering of a Very Long Metal Nanowire Network by Conducting-Polymer-Assisted Joining for a Flexible Touch-Panel Application

A very simple, room-temperature nanosoldering of a Ag nanowire percolation network by conducting-polymer-assisted nanowire joining is developed to demonstrate highly flexible, and even stretchable, transparent conductors. Furthermore, a large area (A4-size) transparent conductor and a flexible touch panel on a non-flat surface are fabricated to demonstrate the possibility of cost-effective mass production and the applicability to the unconventional arbitrary soft, non-flat surfaces.



Organic Solar Cells

M. Song, D. S. You, K. Lim, S. Park,
S. Jung, C. S. Kim, D.-H. Kim,
D.-G. Kim, J.-K. Kim, J. Park, Y.-C. Kang,
J. Heo, S.-H. Jin, J. H. Park*,
J.-W. Kang*4177–4184



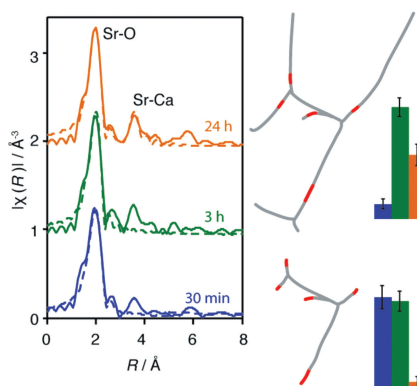
Highly Efficient and Bendable Organic Solar Cells with Solution-Processed Silver Nanowire Electrodes

Highly bendable and efficient organic solar cells are developed using solution-processed silver nanowires. The electrode and solar cell characterizations are also presented with the devices showing high performance and flexibility.

Biomineralization

C. C. Tester, C.-H. Wu, M. R. Krejci,
L. Mueller, A. Park, B. Lai, S. Chen,
C. Sun, M. Balasubramanian,
D. Joester*4185–4194

Time-Resolved Evolution of Short- and Long-Range Order During the Transformation of Amorphous Calcium Carbonate to Calcite in the Sea Urchin Embryo

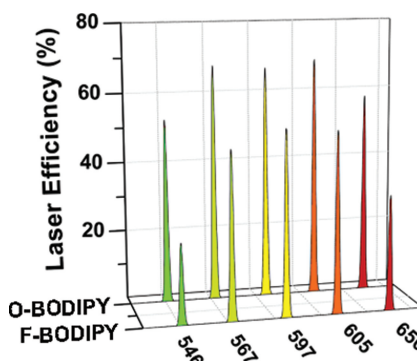


Strontium is used as a probe to investigate the structural transformation of amorphous calcium carbonate in sea urchin larval spicules. Sr K-edge X-ray absorption spectroscopy reveals that crystallization occurs in three stages: 1) hydrated amorphous calcium carbonate, 2) disordered calcite, and 3) mature calcite.

Optically Active Materials

G. Durán-Sampedro, A. R. Agarrabeitia,
L. Cerdán, M. E. Pérez-Ojeda, A. Costela,
I. García-Moreno,* I. Esnal,
J. Bañuelos, I. López Arbeloa,
M. J. Ortiz* 4195–4205

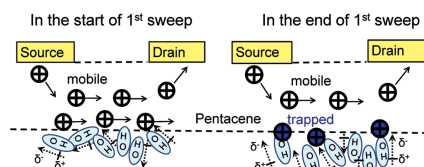
Carboxylates versus Fluorines: Boosting the Emission Properties of Commercial BODIPYs in Liquid and Solid Media



The development of new O-BODIPYs, synthesized via the replacement of fluorine atoms by carboxylate groups in commercial (4,4-difluoro-4-bora-3a,4a-diaza-s-indacene) (F-BODIPYs), is a successful strategy to obtain optimized laser dyes. Poly(methyl methacrylate) (PMMA) doped with these new derivatives leads to laser materials that are economically affordable and have optimized emission properties in the visible spectral region.

FULL PAPERS

The use of non-ferroelectric gate dielectrics to fabricate organic field-effect transistor memory elements by manipulating the molecular dipoles in the dielectric layer is highlighted. The applied gate bias partially aligns the orientations of the hydroxyl groups perpendicular to the substrate at the pentacene/dielectrics interface, which trap charges and cause the hysteresis.

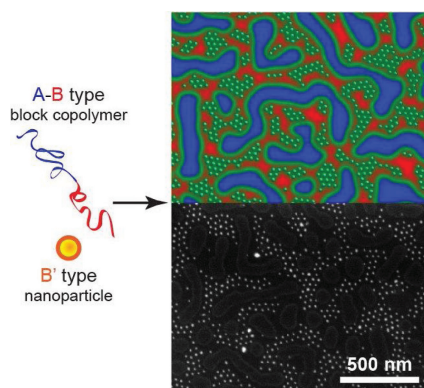


Field-Effect Transistors

T.-D. Tsai, J.-W. Chang, T.-C. Wen,
T.-F. Guo* 4206–4214

Manipulating the Hysteresis in Poly(vinyl alcohol)-Dielectric Organic Field-Effect Transistors Toward Memory Elements

Combining block copolymers with nanoparticles that are highly incompatible with one block and only slightly incompatible with the other leads to hierarchical nanoparticle structures. While the block copolymer domains evolve, the nanoparticles segregate to the least incompatible domain. Then, they phase separate from it, forming hexagonally packed arrays within its confines, where interparticle distance is determined by the ligand length.

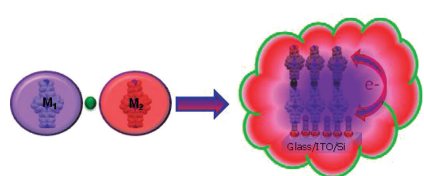


Nanocomposites

E. Ploshnik, K. M. Langner,
A. Halevi, M. Ben-Lulu, A. H. E. Müller,
J. G. E. M. Fraaije, G. J. A. Sevink,*
R. Shenhar* 4215–4226

Hierarchical Structuring in Block Copolymer Nanocomposites through Two Phase-Separation Processes Operating on Different Time Scales

Fabrication of surface-confined heterometallic molecular dyads (SURHMDs) composed of optically rich and redox-active molecular building blocks yields enlargement of optical window in the visible region along with occurrence of multiple redox states at low potential. The copper-mediated intramolecular electronic communication between distinct metal centers can provide potential alternatives to the prototype semiconductor-based memory devices, information processing units, or smart photonic materials.

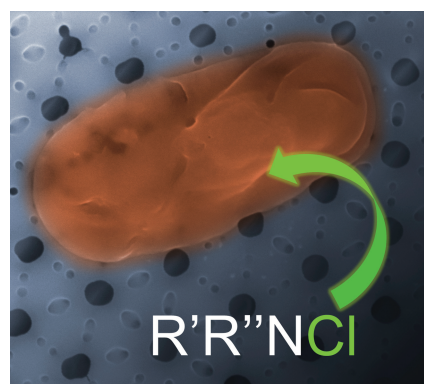


Hybrid Materials

T. Gupta,* P. C. Mondal, A. Kumar,
Y. L. Jeyachandran,
M. Zharnikov* 4227–4235

Surface-Confined Heterometallic Molecular Dyads: Merging the Optical and Electronic Properties of Fe, Ru, and Os Terpyridyl Complexes

Bio-inspired synthesis techniques are capable of producing bio-inorganic composite materials under benign reaction conditions. A facile method for the antimicrobial functionalization of such composites is described. The nitrogen moieties associated with the biopolymers entrapped within the hybrid material are chlorinated in situ to yield halamine compounds. These halamine-charged materials exhibit potent bactericidal and sporicidal activity.



Biomimetics

M. B. Dickerson, W. J. Lyon,
W. E. Gruner, P. A. Mirau,
M. L. Jespersen, Y. Fang,
K. H. Sandhage, R. R. Naik* 4236–4245

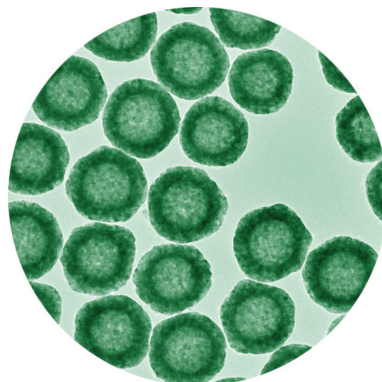
Unlocking the Latent Antimicrobial Potential of Biomimetically Synthesized Inorganic Materials

FULL PAPERS

Photochemistry

J. B. Joo, I. Lee, M. Dahl, G. D. Moon,
F. Zaera, Y. Yin* 4246–4254

Controllable Synthesis of Mesoporous TiO₂ Hollow Shells: Toward an Efficient Photocatalyst

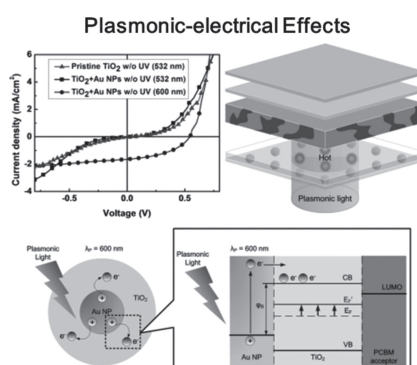


A simple yet effective method is developed for the synthesis of hollow mesoporous TiO₂ nanoshells with well-controlled crystallinity and phase. It is now convenient to optimize their structures for enhanced performance in photocatalysis.

Solar Cells

D. Zhang, W. C. H. Choy,* F. Xie,
W. E. I. Sha, X. Li, B. Ding, K. Zhang,
F. Huang, Y. Cao..... 4255–4261

Plasmonic Electrically Functionalized TiO₂ for High-Performance Organic Solar Cells

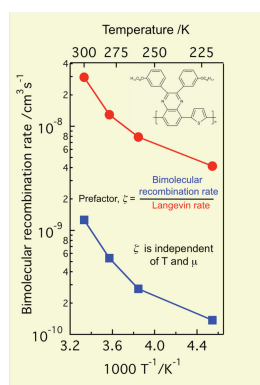


Plasmonic-induced carrier extraction enhancements (plasmonic-electrical effects) in organic solar cells (OSCs) are investigated. Using a nanoparticle (NP)-TiO₂ composite, an enhanced efficiency of 8.74% is reached. The device can efficiently operate at plasmonic wavelengths far longer than the original UV region. The enhancement is attributed to the plasmonic-induced charge injection process. This mechanism favors trap filling in TiO₂, which facilitates carrier transport in OSCs.

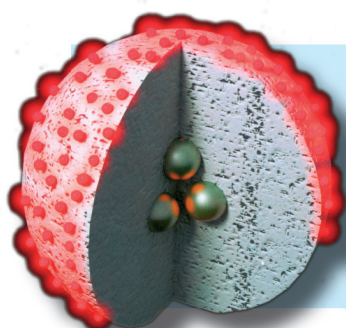
Organic Photovoltaics

D. H. K. Murthy, A. Melianas, Z. Tang,
G. Juška, K. Arlauskas, F. Zhang,
L. D. A. Siebbeles, O. Inganäs,
T. J. Savenije* 4262–4268

Origin of Reduced Bimolecular Recombination in Blends of Conjugated Polymers and Fullerenes



The measured bimolecular recombination rate of electrons and holes in a polymer:fullerene blend is 20 times smaller than the Langevin rate. The reduced rate is explained in terms of dissociation of electron-hole encounter complexes into free charge carriers rather than decay to the ground state.



How to contact us:

Editorial Office:

Phone: (+49) 6201-606-286/531
Fax: (+49) 6201-606-500
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