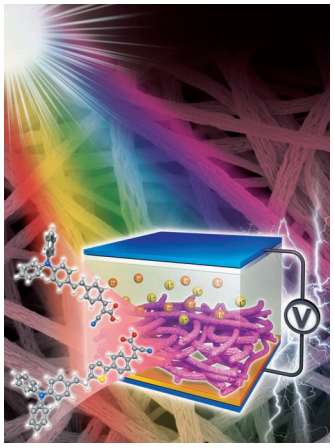
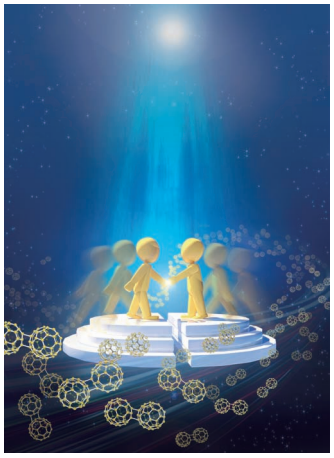
ADVANCED FUNCTIONAL MATERIALS

www.afm-journal.de



Solar Cells

Highly porous amorphous Zn_2SnO_4 electrodes are prepared using electrospinning techniques and combined with organic or ruthenium dyes to fabricate dye-sensitized solar cells. As reported by Sung-Yeon Jang, Renaud Demadrille, Il-Doo Kim, and co-workers on page 3146, the devices based on 3-μm-thick electrodes and the organic dyes demonstrate significantly improved performances compared to those using the ruthenium complex. Using this approach, solar cells with power conversion efficiencies up to 3.7% are obtained.

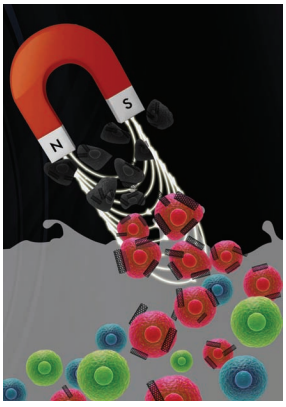


Photochemistry

On page 3220 Ludvig Edman and co-workers report that the efficiency of the photochemical monomer-to-dimer transformation of the fullerene [6,6′]-phenyl-C_{61}-butyric acid methyl ester (PCBM) is strongly dependent on the light intensity. This information is used to demonstrate that direct patterning of electronically active PCBM films can be effectuated by sub-second UV-light exposure. It is demonstrated that the fullerene dimer formation must constitute a bi-excited reaction between two neighboring monomers photoexcited to the triplet state.

Magnetic Carbon Nanotubes

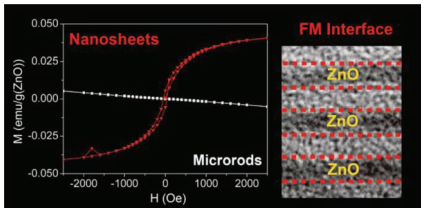
Epidermoid carcinoma model cell lines overexpressing epidermal growth factor receptor (EGFR+) can be sorted off and selectively killed from a population of a "healthy" (EGFR-) cell line. On page 3173, Davide Bonifazi and co-workers report that this is due to the combined action of the conjugated targeting antibody and the Fe-filled carbon nanotubes, with the latter exerting a magnetic fluid hyperthermia.



CONTENTS

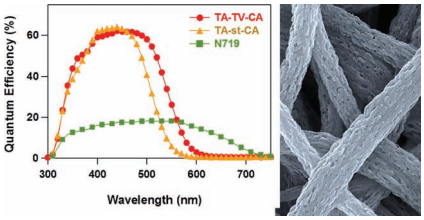
FULL PAPERS

Ferromagnetic Materials



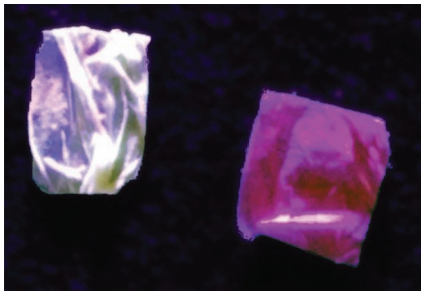
Dense integration of interfacial ferromagnetic centers in the lamellar structure gives enhanced ferromagnetism to ZnO nanosheets. Anion exchange with dodecyl phosphate layers strongly suppresses ferromagnetic ordering as a result of surface defect passivation while maintaining bulk-like n-type semiconducting properties.

Solar Cells



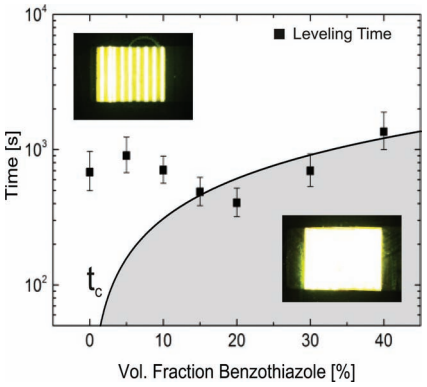
Dye-sensitized solar cells (DSSCs) combining Zn_2SnO_4 fiber-based photoelectrodes and purely organic sensitizers are fabricated. The highly porous amorphous Zn_2SnO_4 electrodes are prepared using electrospinning techniques and combined with a new organic dye. Using this strategy, devices that show photovoltaic conversion up to 3.7% are produced. The results rank among the highest reported for devices using ternary metal oxide sensitized electrodes.

Electrospinning



Electrospun nonwovens with chameleon-type surface properties are obtained by green electrospinning of acrylate dispersions with ionic moieties followed by photo cross-linking. The resulting chameleon nonwovens can be coated by layer-by-layer deposition with a large variety of different functional materials including dyes, antibacterial compounds, silver, and gold nanoparticles.

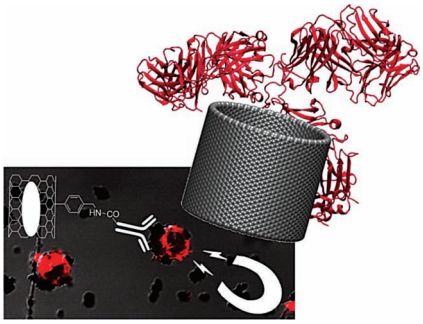
Light-Emitting Diodes



The interplay between surface tension, viscosity, and drying time of organic semiconducting inks is taken into account to fabricate homogeneous active layers for organic light-emitting diodes (OLEDs) by gravure printing. The optimal formulation of the ink is identified when its properties allow a film leveling time shorter that the critical "freezing" time.

FULL PAPERS

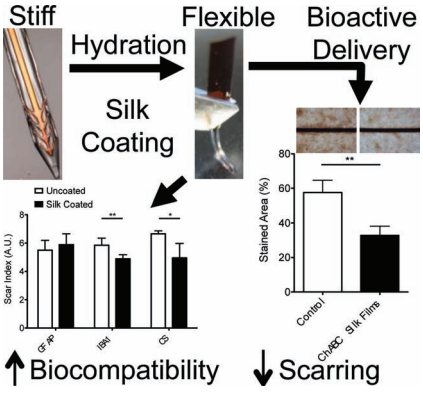
Encapsulation of Fe phases inside multi-walled carbon nanotubes (MWCNTs) allows isolating reactive magnetic phases exerting magnetic fluid hyperthermia responses. In particular, bioconjugation of Fe@MWCNTs with monoclonal antibody *Cetuximab* enables the selective in vitro cancer cell sorting and stimuli-induced cytotoxicity under application of external magnetic inputs. Molecular dynamics calculations shed further light on binding modes and conformational properties of the Ab moieties linked on to the tubular carbon framework.



Nanotubes

Functionalized Fe-Filled Multiwalled Carbon Nanotubes as Multifunctional Scaffolds for Magnetization of Cancer Cells

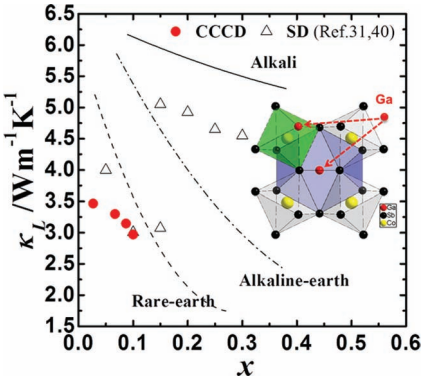
Silk fibroin is investigated as a novel material for fabricating brain-penetrating electrodes with dynamic mechanical properties and the capacity to deliver sensitive therapeutics. Silk coatings are shown to natively reduce some markers of gliosis in vitro, and a further reduction is demonstrated by encapsulation and release of the enzyme chondroitinase ABC.



Biomaterials

Silk as a Multifunctional Biomaterial Substrate for Reduced Glial Scarring around Brain-Penetrating Electrodes

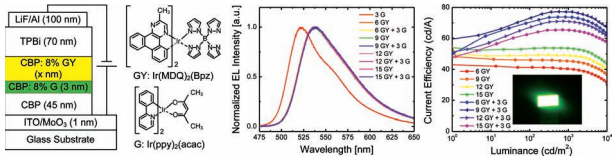
Ga occupies both the void and Sb sites in $CoSb_3$ which is proven by combining first-principles calculations and experiments. The stabilization of the Ga impurity as a compound defect extends the region of skutterudite phase stability toward $Ga_{0.15}Co_4Sb_{11.95}$, whereas the solid–solution region becomes much smaller in other directions of the phase diagram. This compensated defect complex leads to a nearly intrinsic semiconductor with low carrier concentration, and therefore high thermopower, which possesses a much reduced lattice thermal conductivity.



Semiconductors

Charge-Compensated Compound Defects in Ga-containing Thermoelectric Skutterudites

A new greenish-yellow emitter is synthesized and a novel device concept is introduced featuring interzone exciton transfer to achieve unprecedented performance: external quantum efficiencies (current efficiencies) of 21.5% (77.4 cd/A) and 20.2% (72.8 cd/A) at 1000 cd/m^2 and 5000 cd/m^2, respectively, for greenish-yellow emitting phosphorescent organic light-emitting diodes, which are excellent for displays and solid-state lighting.



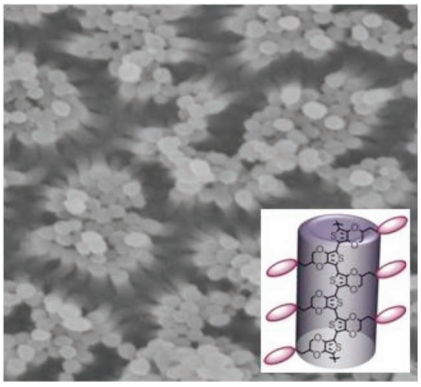
Organic Light-Emitting Diodes

Highly Efficient Greenish-Yellow Phosphorescent Organic Light-Emitting Diodes Based on Interzone Exciton Transfer

CONTENTS

FULL PAPERS

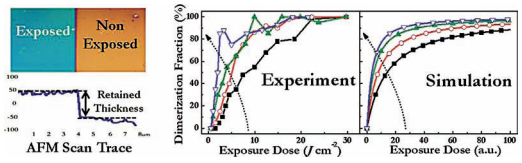
Nanorods



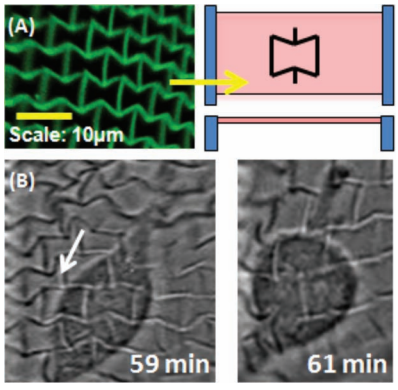
Nanorod arrays of functionalized poly(3,4-ethylenedioxythiophene) (PEDOT) are assembled by using an anodic aluminum oxide template directly fabricated on gold-coated silicon wafers. These nanorod arrays are promising for organic electronic and biomedical applications. This approach allows a platform to understand the molecular and nanostructural effect on the surface wettability of these materials.

Organic Electronics

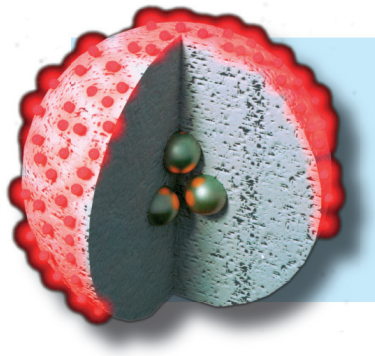
The photochemical monomer-to-dimer transformation of the fullerene [6,6′]-phenyl-C_{61}-butyric acid methyl ester (PCBM) is strongly dependent on the light intensity. This is utilized to realize sub-second UV-light induced patterning of electronically active PCBM films. Dimer formation takes place between two monomers photo-excited to the triplet state. These findings challenge the conventional wisdom in the field.



Biomaterials



A methodology to develop suspended structures with tunable Poisson's ratios is reported. Two-photon polymerization is used to fabricate suspended web structures with a negative Poisson's ratio (NPR), based on analytical models. This technique could be used to investigate effects of altering the Poisson's ratio of several photocurable biomaterials on a variety of cellular aspects including morphology, gene expression, and migration using different cell types.



How to contact us:

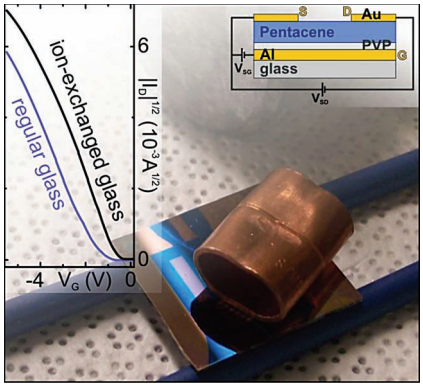
Editorial Office:
Phone: (+49) 6201-606-286/531
Fax: (+49) 6201-606-500
Email: afm@wiley-vch.de

Reprints:
cherth@wiley-vch.de

Copyright Permission:
Fax: (+49) 6201-606-332
Email: rights@wiley-vch.de

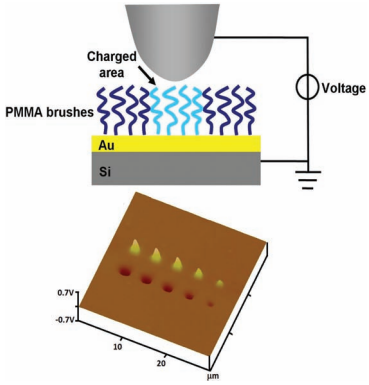
FULL PAPERS

An ion-exchanged glass is introduced as a new substrate that is not only virtually unbreakable, therefore overcoming the brittleness that Si wafers possess, but also allows fabrication of high performance organic electronic devices. The smoothness of the surface of this fusion-drawn glass enables favorable large grain growth of the semiconductor, enabling high charge carrier mobilities of all kinds of organic semiconductors, such as pentacene or C60.



Organic Electronics

Poly(methyl methacrylate) (PMMA) brushes are demonstrated for the first time as electrets. Micro/nano patterns of electrostatic charges are fabricated on PMMA brushes by conductive microcontact printing and AFM lithography. The electrostatic charges on PMMA brushes are stable enough in organic solvents for guiding the assembly of nanoparticles and directing the dewetting of bulk polymer thin films.



Electrets