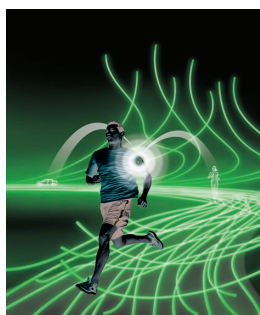


ADVANCED FUNCTIONAL MATERIALS

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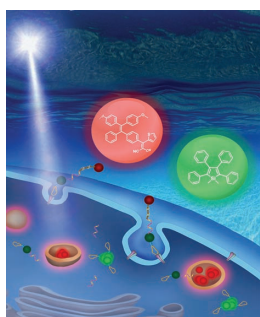
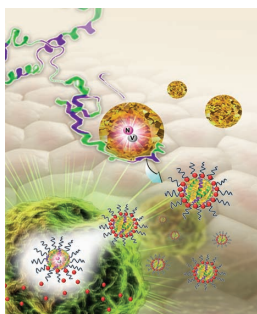


Wearable Electronics

Body-integrated wearable electronics for health monitoring, security, and wellness applications required flexible, conforming, and stretchable electronics, due to the motion of the human body. On page 6565, J. A. Rogers, A. Shamim, M. M. Hussain and co-workers develop a helical spring-based flexible and out-of-plane-stretchable antenna made with copper and showing constant frequency operation for far field communication—demonstrating a major advancement in wearable and implantable electronics.

Biopolymers

Versatile biopolymer coatings for advancing fluorescent nanodiamonds are presented as unique magneto-optic materials for biomedical applications by Y. Wu, F. Jelezko, T. Weil, and co-workers on page 6576. The coatings—derived from a human protein—provide high biocompatibility and can be modified with various functional entities. Excellent colloidal and fluorescence stabilities allow monitoring of drug distribution and release processes, offering great prospects for theranostics.

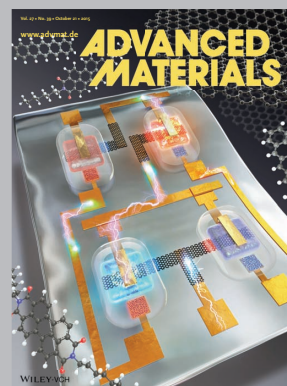
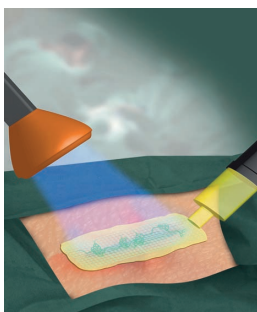


Photodynamic Therapy

On page 6586, B. Z. Tang, B. Liu and co-workers synthesize a photosensitizer (PS) probe with a built-in apoptosis sensor for targeted cancer cell ablation and real-time monitoring of PS activation and therapeutic response. The probe is non-emissive in aqueous media, and, when selectively taken up by cancer cells, can be cleaved to release the apoptosis sensor, turning on red fluorescence. Upon light irradiation cell apoptosis is induced, and the apoptosis sensor is cleaved to yield intense green fluorescence.

Tissue Adhesives

On page 6596, M. Malkoch and co-workers details a solvent-free methodology to generate soft tissue adhesive patches (STAPs) with embedded surgical mesh, by capitalizing on the Newtonian melt behavior of dendritic-linear-dendritic dumbbell components. The highly crosslinked STAPs featured low swelling and sufficient mechanical stability were fabricated on demand and in seconds using benign light initiation.



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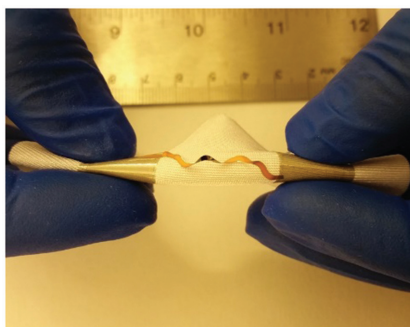
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FULL PAPERS

A flexible and stretchable antenna, enabled by out-of-plane stretching and fabricated using a low-cost metal (copper), demonstrates constant frequency operation for far-field communication—up to 80 m on a human arm at 1.25 mW transmission power.

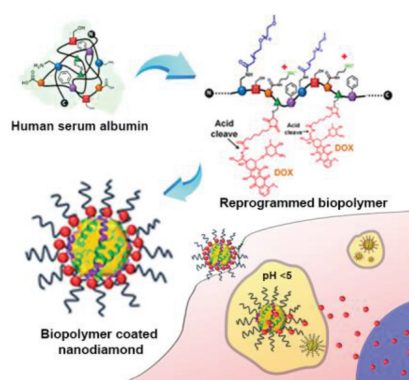


Wearable Electronics

A. M. Hussain, F. A. Ghaffar, S. I. Park, J. A. Rogers,* A. Shamim,*
M. M. Hussain*6565–6575

Metal/Polymer Based Stretchable Antenna for Constant Frequency Far-Field Communication in Wearable Electronics

A versatile biopolymer platform for advancing fluorescent nanodiamonds as unique magnetooptic materials for biomedical applications is reported. The biopolymer coatings are designed by chemical reprogramming the functionalities of albumin, which offer high biocompatibility and precise modification with various functional entities. The biopolymer coated nanodiamonds reveal excellent colloidal stabilities even after loading high numbers of hydrophobic doxorubicin for drug delivery.

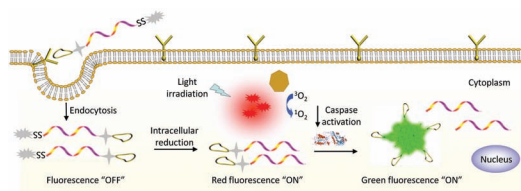


Biopolymers

Y. Wu,* A. Ermakova, W. Liu, G. Pramanik, T. M. Vu, A. Kurz, L. McGuinness, B. Naydenov, S. Hafner, R. Reuter, J. Wrachtrup, J. Isoya, C. Förtsch, H. Barth, T. Simmet, F. Jelezko,* T. Weil*6576–6585

Programmable Biopolymers for Advancing Biomedical Applications of Fluorescent Nanodiamonds

A novel light-up probe is developed for targeted and activatable photodynamic therapy with real-time in situ reporting of sensitizer activation and therapeutic responses.



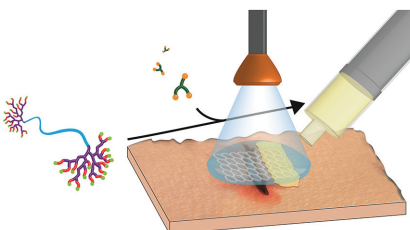
Photodynamic Therapy

Y. Yuan, C.-J. Zhang, R. T. K. Kwok, S. Xu, R. Zhang, J. Wu, B. Z. Tang,*
B. Liu*6586–6595

Light-Up Probe for Targeted and Activatable Photodynamic Therapy with Real-Time In Situ Reporting of Sensitizer Activation and Therapeutic Responses



Solvent-free tissue adhesives based on dendritic–linear–dendritic (DLD) components are presented, which cure in seconds, on demand, and with light initiation thiol-ene coupling chemistry. Current tissue adhesives lack sufficient strength or biocompatibility for novel use in surgery. The Newtonian melt behavior of DLDs enable gels with low swelling and sufficient mechanical stability to be used in soft tissue adhesive patch concepts.



Tissue Adhesives

V. Granskog, O. C. J. Andrén, Y. Cai, M. González-Granillo, L. Felländer-Tsai, H. von Holst, L.-A. Haldosen, M. Malkoch*6596–6605

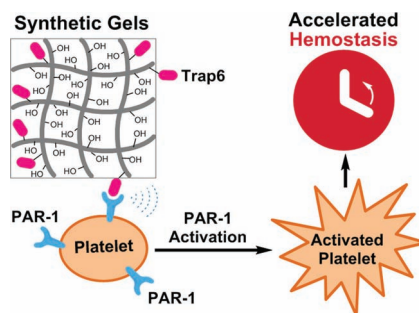
Linear Dendritic Block Copolymers as Promising Biomaterials for the Manufacturing of Soft Tissue Adhesive Patches Using Visible Light Initiated Thiol–Ene Coupling Chemistry

FULL PAPERS

Hydrogels

X.-H. Qin,* K. Labuda, J. Chen,
V. Hruschka, A. Khadem, R. Liska,
H. Redl, P. Slezak..... 6606–6617

Development of Synthetic Platelet-Activating Hydrogel Matrices to Induce Local Hemostasis

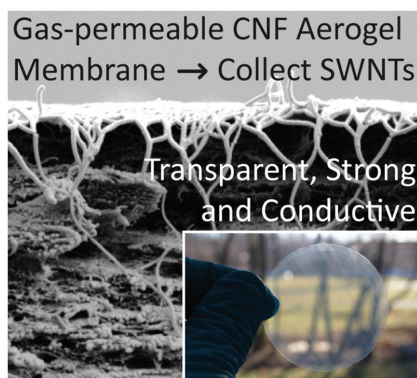


A synthetic hemostatic hydrogel system which avoids the use of thrombin, but allows platelet activation and shortens bleeding time in a localized fashion, is introduced. The thrombin receptor agonist peptide is, upon UV irradiation, covalently attached on biocompatible polyvinyl alcohol hydrogels via facile photoclick conjugation, demonstrating the utility of this system for hemorrhage control and potential medical applications.

Cellulose Nanofibrils

M. S. Toivonen, A. Kaskela, O. J. Rojas,
E. I. Kauppinen,* O. Ikkala* ... 6618–6626

Ambient-Dried Cellulose Nanofibril Aerogel Membranes with High Tensile Strength and Their Use for Aerosol Collection and Templates for Transparent, Flexible Devices

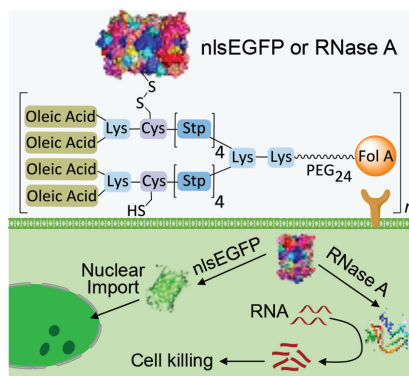


Facile ambient preparation of cellulose nanofibril (CNF) aerogel membranes is presented. Their use in collection of single-walled carbon nanotubes (SWNT) from a gas stream is demonstrated to prepare flexible, transparent, and conductive films. These results point a direction for scalable preparation of aerogels and demonstrate their potential for applications involving capturing aerosol particles and transparent, flexible electronics.

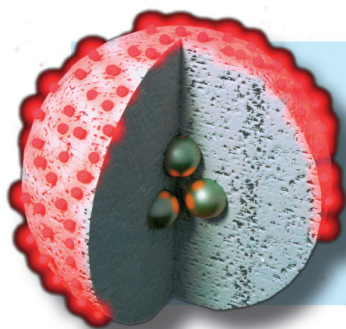
Bionanotechnology

P. Zhang, D. He, P. M. Klein, X. Liu,
R. Röder, M. Döblinger,
E. Wagner*..... 6627–6636

Enhanced Intracellular Protein Transduction by Sequence Defined Tetra-Oleoyl Oligoaminoamides Targeted for Cancer Therapy



A PEGylated folate-receptor targeted two-arm oligomer containing both arms terminally modified with two oleic acids potently transduces nlsEGFP or RNase A into the cytosol, where nlsEGFP undergoes efficient delivery into the nucleus, and RNase A elicits most effective killing of folate-receptor-positive cancer cells.



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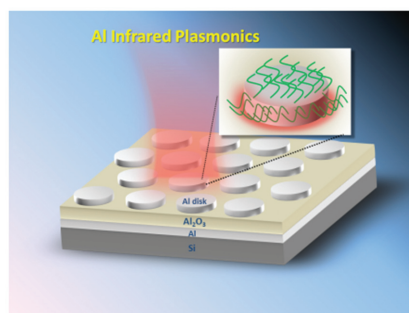
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FULL PAPERS

Infrared aluminum metamaterial perfect absorbers (MPAs) are fabricated using scalable and cost-effective colloidal lithography and dry etching. The plasmon resonances can be readily tuned by the etching time of polystyrene spheres. Chemical surface functionalization of the MPAs is achieved using phosphonic acid making it possible to use Al for surface enhanced infrared absorption spectroscopy.

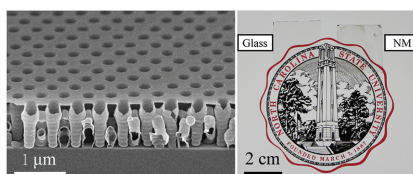


Perfect Absorbers

K. Chen,* T. D. Dao, S. Ishii,
M. Aono, T. Nagao*6637–6643

Infrared Aluminum Metamaterial Perfect Absorbers for Plasmon-Enhanced Infrared Spectroscopy

Ordered 3D thin-shell nanolattice materials are fabricated using a combination of nanolithography and atomic layer deposition to achieve refractive indices from 1.025 to 1.3. Compared with random architectures, the periodically ordered nanolattice materials possess the advantages of designable refractive indices, enhanced mechanical stability, and reduced scattering. Nanolattice materials can find applications in photonic structures, waveguides, resonators, and ultra-low- k dielectrics.

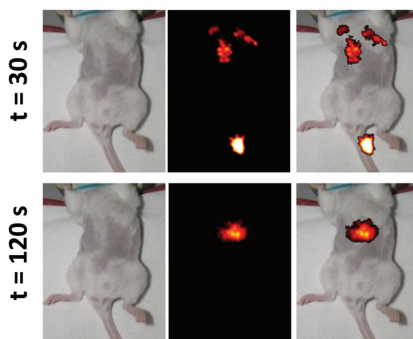


Nanolithography

X. A. Zhang, A. Bagal, E. C. Dandley,
J. Zhao, C. J. Oldham, B.-I. Wu,
G. N. Parsons, C.-H. Chang* ...6644–6649

Ordered 3D Thin-Shell Nanolattice Materials with Near-Unity Refractive Indices

Low-dose in vivo near-infrared (NIR) fluorescence imaging is achieved by using carefully designed PbS/CdS/ZnS quantum dots (QDs), intensely emitting within the second biological window (1000–1350 nm). Moreover, preliminary studies both in vitro and in vivo have proven the lack of noticeable toxicity of these QDs. As an additional advantage, this NIR-fluorescence imaging platform has demonstrated useful multifunctionality, thus being capable, both ex vivo and in vitro, of high-resolution thermal sensing in the physiological temperature range.

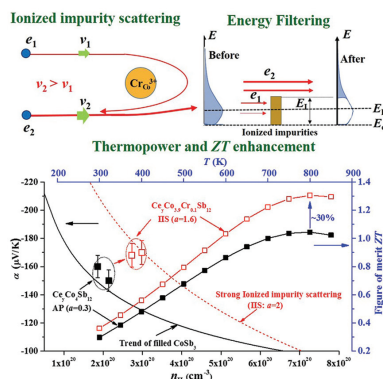


Bioimaging

A. Benayas, F. Ren, E. Carrasco,
V. Marzal, B. del Rosal, B. A. Gonfa,
Á. Juarranz, F. Sanz-Rodríguez,
D. Jaque,* J. García-Solé, D. Ma,*
F. Vetrone*6650–6659

PbS/CdS/ZnS Quantum Dots: A Multifunctional Platform for In Vivo Near-Infrared Low-Dose Fluorescence Imaging

Introduction of ionized impurity scattering through Cr-doping in $\text{Ce}_y\text{Co}_4\text{Sb}_{12}$ effectively filters low energy electrons and largely increases the overall electron entropy, thus appreciably increasing the Seebeck coefficient in a wide temperature range. This effect moderately improves the power factor and ZT by overcompensating the reduction in mobility and decreasing the thermal conductivity.



Electron Entropy

S. Wang, J. Yang, L. Wu, P. Wei,
W. Zhang,* J. Yang*6660–6670

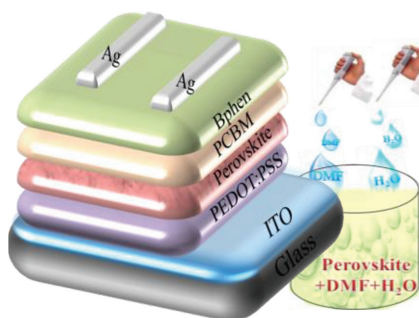
On Intensifying Carrier Impurity Scattering to Enhance Thermoelectric Performance in Cr-Doped $\text{Ce}_y\text{Co}_4\text{Sb}_{12}$

FULL PAPERS

Perovskite Solar Cells

X. Gong, M. Li, X.-B. Shi, H. Ma,
Z.-K. Wang,* L.-S. Liao*,..... 6671–6678

**Controllable Perovskite Crystallization
by Water Additive for High-Performance
Solar Cells**

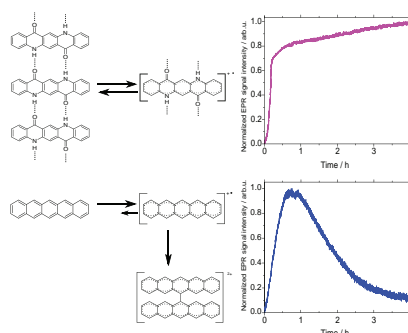


Water additive is incorporated into the perovskite precursor solution to control the oriented growth of crystal perovskites and improve the stability of perovskite solar cells. As a result, a power conversion efficiency of 16.06% and an improved cell stability under ambient conditions are achieved.

Indigoids

C. Enengl,* S. Enengl, M. Havlicek,
P. Stadler, E. D. Glowacki,
M. C. Scharber, M. White, K. Hingerl,
E. Ehrenfreund, H. Neugebauer,
N. S. Sariciftci..... 6679–6688

**The Role of Heteroatoms Leading to
Hydrogen Bonds in View of Extended
Chemical Stability of Organic
Semiconductors**



Air- and moisture-resistivity as well as chemical stability are key issues for organic electronics and thus, influence the operational lifetime of devices. The hydrogen-bonded pigment quinacridone is an example for extraordinary chemical stability. Here, spectroscopic studies on quinacridone as compared to pentacene thin-films confirm different spectral response of their radical cations, emphasizing the stability on quinacridone.

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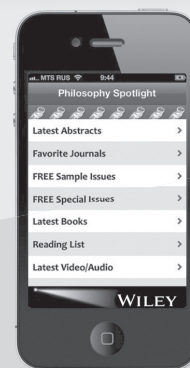
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