

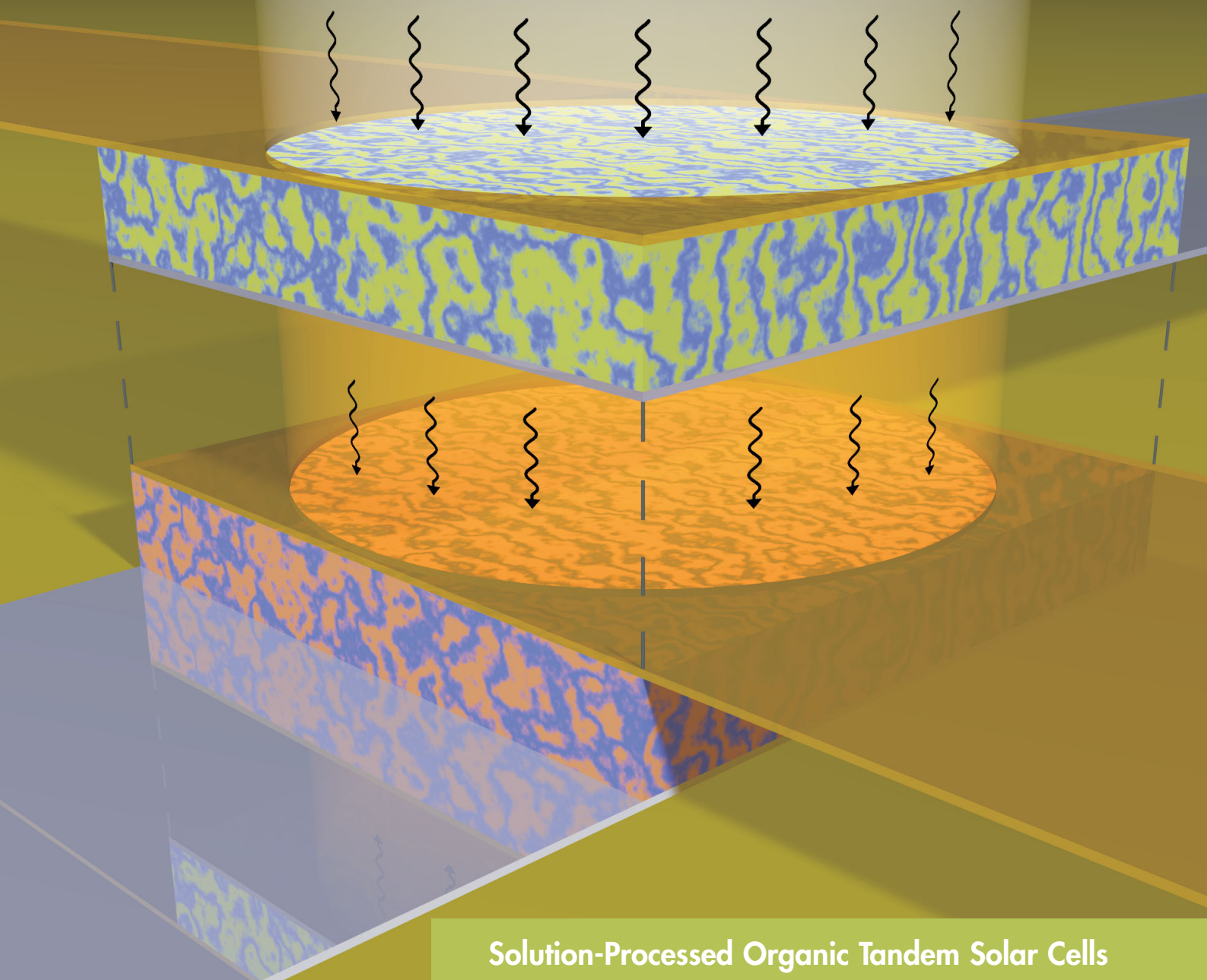
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ADVANCED FUNCTIONAL MATERIALS

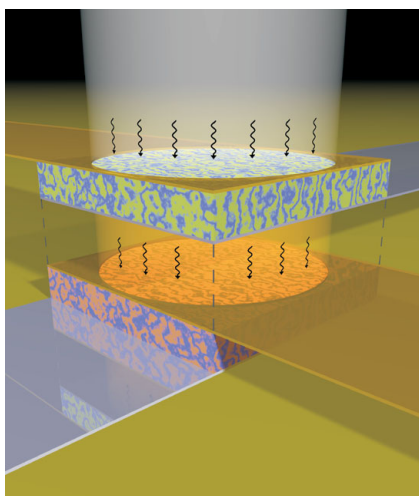


Solution-Processed Organic Tandem Solar Cells

Laser Emission from a Liquid-Crystal Photonic Device

pH-Responsive Gating Membrane Systems

Enhanced Channel Interconnectivity in Pentacene TFTs



ADVANCED FUNCTIONAL MATERIALS

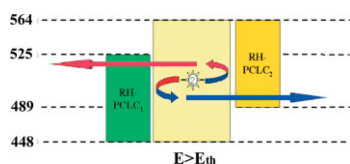
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Cover:

The fabrication of a solution-processed polymer tandem cell by stacking two single cells in series is reported by de Boer and co-workers on p. 1897. The bottom and top cell are complementary with respect to their absorption

spectra and the layer thickness of the bottom cell was optimized in order to create an optical cavity that efficiently transmits the required wavelength for the top cell. The combination of this tandem architecture with more efficient small-bandgap materials will enable the realization of highly efficient organic solar cells.

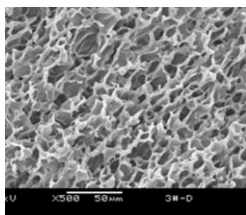
Photonic Devices



A liquid-crystal (LC) device structure that consists of a nematic LC sandwiched between two polymer cholesteric LCs is fabricated by Takezoe and co-workers, as described on p. 1793. Electrotunable non-reciprocal light transmittance and unidirectional circularly polarized lasing

emission are successfully demonstrated by the reorientation of the NLC under an applied voltage.

Membranes



A composite membrane system for pH-responsive controlled release is reported by Chu and co-workers on p. 1865. The pH-responsive polymeric gating membranes act as valves and surround a reservoir of crosslinked hydrogel, which acts as a pumping element. This system goes beyond the limits of concentration-driven diffusion due to the pumping effects of the hydrogel and may lead to “smart” controlled-release systems for drug delivery and sensors in the future.

Thin-Film Transistors

To improve the field-effect mobility of pentacene thin-film transistors, Cho and co-workers (p. 1859) controlled the deposition conditions of the pentacene layers. Voids at the interface between the pentacene film and the dielectric layer were thus filled and the interconnectivity in the thin-film channels improved. The usefulness of this approach is confirmed by atomic force microscopy.

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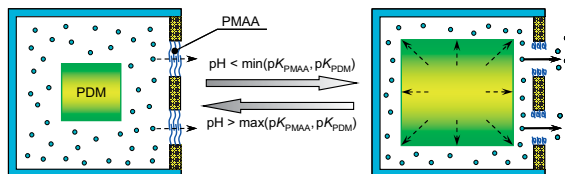
FULL PAPERS

Stimuli-Responsive Materials

J.-B. Qu, L.-Y. Chu,* M. Yang, R. Xie, L. Hu, W.-M. Chen 1865 – 1872

A pH-Responsive Gating Membrane System with Pumping Effects for Improved Controlled Release

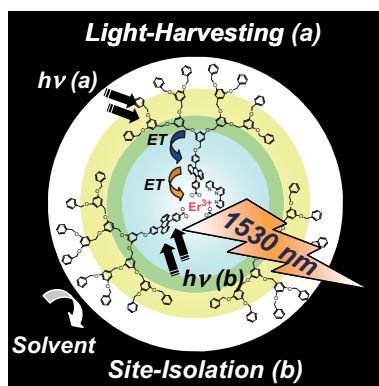
pH-responsive polymer pumps composed of a porous membrane with linear-grafted poly(methacrylic acid) (PMAA) gates acting as functional valves and a crosslinked poly(*N,N*-dimethylaminoethyl methacrylate) (PDM) hydrogel inside the reservoir are a novel route to “smart” controlled-release systems. The cooperative, simultaneous pH responses of the acidic- and basic-responsive polymers accelerate the responsive release rate by a pumping effect (see figure).



Rare-Earth Complexes

N. S. Baek, Y. H. Kim, S.-G. Roh, B. K. Kwak, H. K. Kim* .. 1873 – 1882

The First Inert and Photostable Encapsulated Lanthanide(III) Complexes Based on Dendritic 9,10-Diphenylanthracene Ligands: Synthesis, Strong Near-Infrared Emission Enhancement, and Photophysical Studies

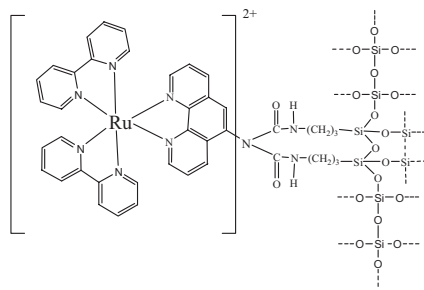


The near-infrared emission intensities of Er³⁺ ions in encapsulated Er³⁺-dendrimer complexes are dramatically enhanced on increasing the generation number of the dendrons, owing to light-harvesting and site-isolation effects (see figure). The energy-transfer (ET) efficiency between the dendritic anthracene ligands and Ln³⁺ via the excited singlet-state was evaluated as being in the range of 90 to 97 %.

Sensors

B. Lei, B. Li,* H. Zhang, S. Lu, Z. Zheng, W. Li, Y. Wang 1883 – 1891

Mesostructured Silica Chemically Doped with Ru^{II} as a Superior Optical Oxygen Sensor

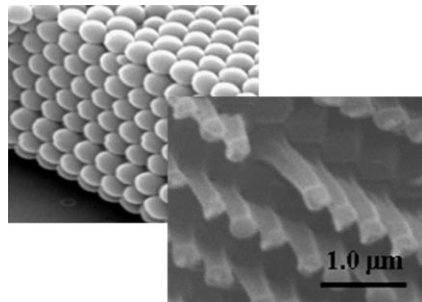


The graphic shows a possible structure of a Ru^{II} complex covalently grafted within cetyltrimethylammoniumbromide template-directed mesostructured silica. It is possible to covalently graft the Ru^{II} complex onto mesosphered silica for oxygen sensing. The mesostructured oxygen sensors show superior properties to those of amorphous samples. Uniformity, improved sensitivity, and a simplified calibration sensor can also be obtained.

Photonic Crystals

C. Paquet, F. Yoshino, L. Levina, I. Gourevich, E. H. Sargent, E. Kumacheva* 1892 – 1896

High-Quality Photonic Crystals Infiltrated with Quantum Dots



Fabrication of photonic crystals infiltrated with PbS quantum dots (QDs) offers a promising route to all-optical limiters. An approach to preparing polymer colloidal crystals heavily loaded with PbS QDs in the interstitial space is reported. The approach uses capillary forces to infiltrate PbS QDs into interstitial spaces and produces high-quality photonic crystals with uniform loading of PbS QDs (see figure).