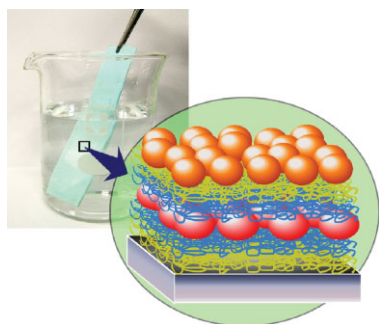


## Layer-by-Layer Biomaterial Assemblies

The layer-by-layer (LbL) adsorption method is a simple and inexpensive method for the preparation of controlled layered structures and it is applicable to a variety of materials. Many biomolecules including proteins, DNA, and oligosaccharide-type biopolymers have been assembled in controlled layered structures using the LbL method. K. Ariga and coworkers discuss in their Review in *Macromolecular Bioscience* recent devel-



opments in layered macromolecular assemblies containing biological components. Amongst others the topics described are sensing of toxic and bio-active chemicals, release and delivery of DNA plasmids, and stem cell differentiation. As a future perspective the combination of the versatile and bio-compatible LbL method with nano-fabricated structures such as the mesoporous materials is introduced. /ks

K. Ariga et al., *Macromol. Biosci.*, DOI: 10.1002/mabi.200800102

## Focus on Coating Technology

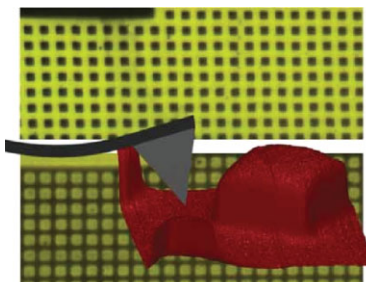
From telecommunications to transport, from energy management to entertainment, the implications and applications of surface-coating technologies influence a wide range of aspects of our everyday lives. A special issue of *Advanced Engineering Materials* on the topic of "Coatings and Surface Engineering" that

contains papers that were presented at the "Thin Film Technology" and "Industrial Applications" symposia of the EUROMAT 2007, held last September in Nuremberg, highlights innovations and advancements in this field. Contributions cover aspects such as deposition techniques, surface functionalization and characterization, structure-property relationships, modeling and simulation studies, and industrial application of these technologies. /lms

*Adv. Eng. Mater.*, 2008, 10, Issue 7

## Manipulating OLEDs Using Patterned Self-Assembled Monolayers

Interface dipoles are an important issue in the process of charge injection from the metallic electrode into the active organic layer in organic light-emitting diodes (OLEDs). Mathijssen and coworkers show the production of patterned OLEDs by a simple microcontact printing



technique. They use two molecules of only 2 nm size with opposing dipole directions, which orient themselves on gold and therefore change the local work function. By applying a monolayer of these molecules on the anode of an LED, they can control the local hole injection, resulting in a direct handle on the local light emission. The work function can be modulated within a resolution smaller than 100 nm, allowing a straightforward and low-cost fabrication process for structuring OLEDs on nanometer length scales. /ks

S. G. J. Mathijssen et al., *Adv. Mater.*, DOI: 10.1002/adma.200800299

## In Brief

### Nanoparticles and Toxicity

The effect of silver and gold nanoparticles on cell membranes was tested using bioluminescent bacteria and a synergistic toxic effect for the cells could be observed. /ct

M. B. Gu et al., *Small*, DOI: 10.1002/sml.200700954

### Liquid-Crystalline Supramolecular Polymers

A series of hydrogen-bonding supramolecular polymers with different silicon-containing carboxylic acids was prepared exhibiting thermotropic liquid-crystalline behavior. /ct

C. Racles et al., *J. Appl. Polym. Sci.*, DOI: 10.1002/app.28516

### Nanoliter Microchamber for Constructing Phase Diagrams

A microfluidic device containing a nanoliter chamber with facile handling properties, ultra low sample consumption, rapid heat exchange, and the capability to study highly concentrated solutions, was developed for the exemplary construction of the phase diagram of an aqueous poly(*N*-isopropyl acrylamide) solution. /ks

B. Zheng et al., *Macromol. Rapid Commun.*, DOI: 10.1002/marc.200800229

### Self-Assembly and Orientation of Cellulose Nanocrystals

In their article Y. Habibi and coworkers investigate the influence of the strength and frequency of an applied external AC electric field as well as the aspect ratio of the nanocrystals onto the assembly and orientation of cellulose nanocrystals during the preparation of thin cellulose films. /ks

Y. Habibi et al., *J. Polym. Sci. Part B: Polym. Phys.*, 2008, 46, 1430

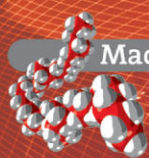
### The Cause of Contrast Inversion

Investigation of a PFS-*b*-PDMS copolymer reveals a remarkable TEM contrast inversion; the result of crosslinking-induced volume shrinkage of PDMS domains upon electron beam radiation. /gk

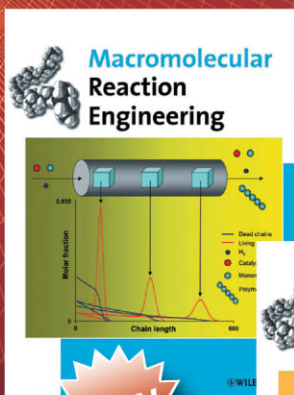
M. A. Winnik et al., *Macromol. Chem. Phys.*, DOI: 10.1002/macp.200800048



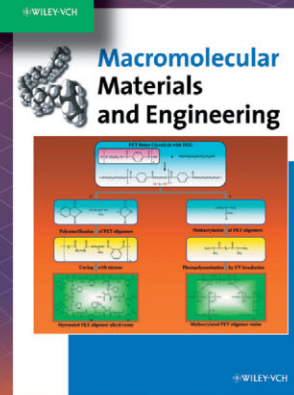
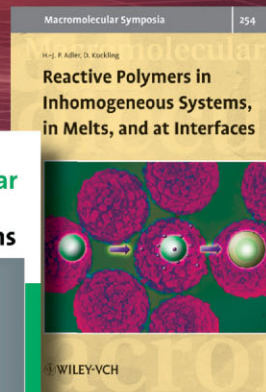
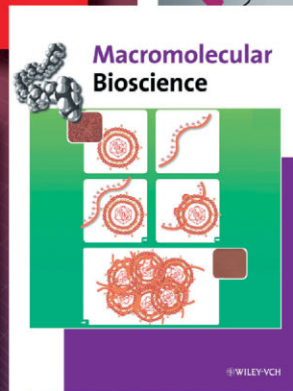
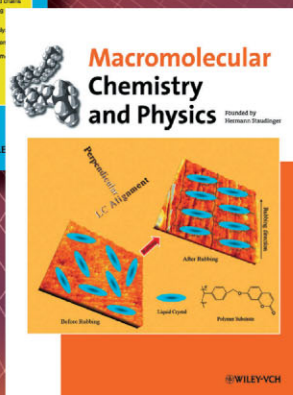
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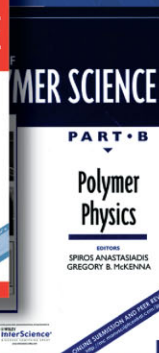
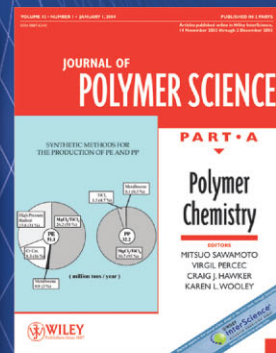
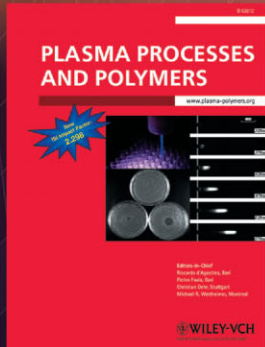
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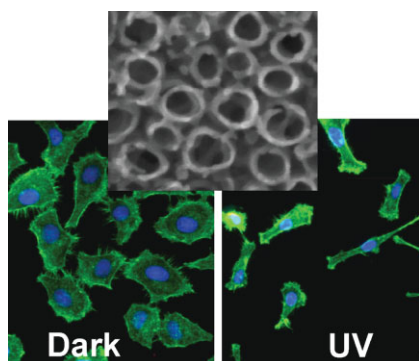
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## Nanotube Photocatalyst Kills Cancer Cells

For the first time, self-organized anodic TiO<sub>2</sub> nanotubes of 50 to 100 nm diameter have been used as a photocatalyst for the photo-induced devitalization of cancer cells from the human cervical carcinoma (HeLa G). It is shown that for the cells in contact with the nanotube layers a

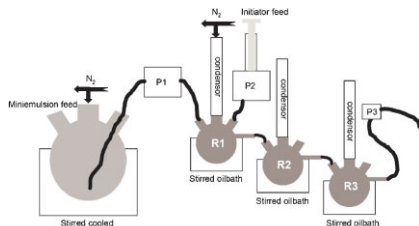


drastic alteration can be triggered upon a low-dose ultraviolet (UV) light irradiation. Cancer cells reduce their size and a significant amount of them are killed. A possible application may be an anti-cancer treatment, where isolated tubes are administrated to a tumor, followed by a focused UV light exposition. /sh

P. Schmuki et al., *phys. status solidi RRL*, DOI 10.1002/psrr.200802080

## Recent Progress in Continuous Miniemulsion Polymerization

Typically, miniemulsion polymerizations are carried out in batch reactors, allowing a maximum of flexibility and adaptability to specialty products. However, a high level of consistency can be reached by using continuous stirred-

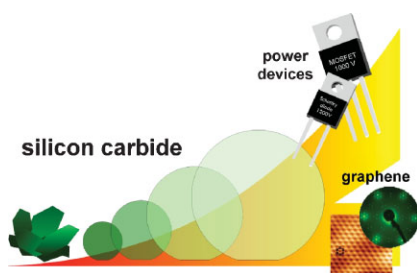


tank reactors (CSTRs) operated at steady state, avoiding the composition drift often seen in batch reactors. CSTR trains allow high throughput and high monomer conversion while retaining most of the benefits of a single CSTR. Furthermore, tubular reactors benefit from an extremely efficient heat transfer caused by the high surface-to-volume ratio. Recent developments in this relatively new field are critically reviewed, with special emphasis on the aspects of monomer diffusion and secondary nucleation. It is also shown that the molecular weight distribution is directly dependent on the reactor residence time distribution for controlled radical polymerizations in continuous reactors, in contrast to the case of free radical chemistries. /ssp

F. J. Schork et al., *Macromol. React. Eng.*, DOI: 10.1002/mren.200800003

## Current Trends in Silicon Carbide

The July edition of *physica status solidi b* is a special issue that covers key aspects of our current understanding of the material and physical basis of silicon carbide (SiC). This compound is a rather new entry in the field of wide band gap semiconductor materials. The issue contains 17 invited Feature Articles, many of them written by members of the Research Unit "Silicon carbide as semiconductor material: novel aspects of crystal growth and doping" which was funded by the Deutsche Forschungsgemeinschaft (DFG) between



2002 and 2008. Also included is an Expert Opinion by Kimimori Hamada (Toyoto Motor Corporation) providing a vision of SiC-based electronics in the hybrid-driven automobile of the future. Guest-edited by Lothar Ley and Gerhard Pensl, University of Erlangen-Nürnberg, Germany, this volume gives a comprehensive overview of important topics ranging from crystal growth and doping to defects characterization and technological applications. /rsl

*phys. status solidi b* 2008, 245, Issue 7

## Highly Read Articles

### Biodegradable Polymers Applied in Tissue Engineering Research: a Review

D. W. Huttmacher et al.  
*Polym. Int.* 2007, 56, 145

### Universal Methodology for Block Copolymer Synthesis

V. Bellas et al.  
*Macromol. Rapid Commun.* 2007, 28, 1415

### Colorimetric Response of Peptide-Functionalized Gold Nanoparticles to Metal Ions

R. R. Naik et al.  
*Small* 2008, 4, 548

### Novel Organic Semiconductors and Processing Techniques for Organic Field-Effect Transistors

K. Müllen et al.  
*phys. status solidi a* 2008, 205, 421

### Effect of Nanotube Functionalization on the Properties of Single-Walled Carbon Nanotube/Polyurethane Composites

B. P. Grady et al.  
*J. Polym. Sci., Part B: Polym. Phys.* 2007, 45, 490

### Controlling Coupling Reaction of EDC and NHS for Preparation of Collagen Gels Using Ethanol/Water Co-Solvents

A. Kishida et al.  
*Macromol. Biosci.* 2008, 8, 32

### Design of Multilayered Nanostructures and Donor-Acceptor Interfaces in Solution-Processed Thin-Film Organic Solar Cells

S. Ito et al.  
*Adv. Funct. Mater.* 2008, 18, 1563

### Quality Concepts for the Improved Use of Recycled Polymeric Materials: A Review

S. Karlsson et al.  
*Macromol. Mater. Eng.* 2008, 293, 274

### Plasma Deposition of Silver Nanoparticles onto Stainless Steel for the Prevention of Fungal Biofilms: A Case Study on *Saccharomyces cerevisiae*

M. Mercier-Bonin et al.  
*Plasma Process. Polym.* 2008, 5, 228

### Magnetic Iron Oxide Nanoworms for Tumor Targeting and Imaging

M. J. Sailor et al.  
*Adv. Mater.* 2008, 20, 1630

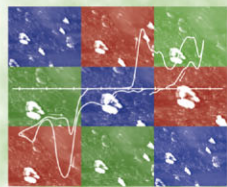
### Synthesis of polymeric core-shell particles using surface-initiated living free-radical polymerization

K. R. Carter et al.  
*J. Polym. Sci., Part A: Polym. Chem.* 2007, 45, 1575

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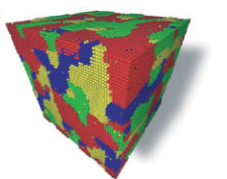
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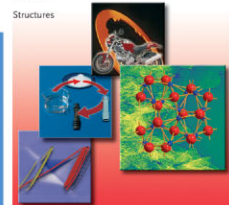
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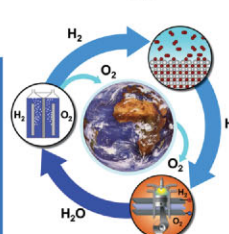
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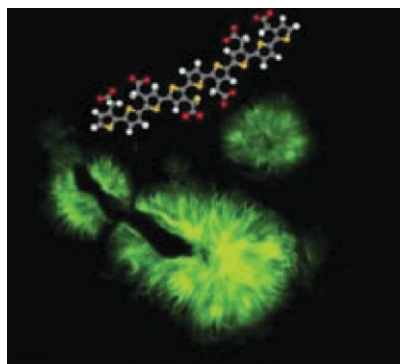
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## Luminescent Conjugated Polymers as Novel Biosensors

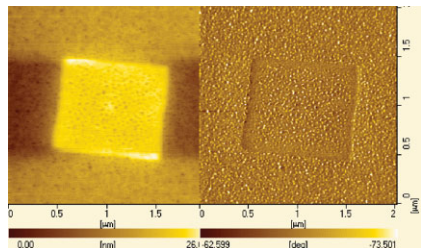
Novel technologies for studying biological events are of great interest. Luminescent conjugated polymers (LCP), normally used in organic electronics, have proven useful for the detection of a wide range of disease-related biological processes. In the latest Research News article in *Advanced Materials* by P. R. Nilsson et al. the LCP technique and its usefulness for studying protein aggregation diseases especially for the much-



needed illuminating insights of the underlying pathological events are highlighted. Further development of LCPs as molecular probes and the employment of amyloid fibrils are also discussed. /ct  
P. R. Nilsson et al., *Adv. Mater.*, DOI: 10.1002/adma.200800663

## Self-Assembly into Square Lamellar Structures

Semicrystalline block copolymers containing at least one crystallizable and one amorphous block have been widely investigated in recent years. As a consequence of microphase separation and crystallization various self-assembled ordered structures on the nanometer

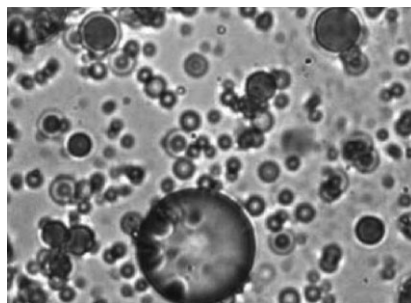


length scales are observed. Y. Han and coworkers now report on the morphology of an H-shaped block copolymer consisting of a poly(ethylene glycol) backbone and polystyrene branches. A peculiar square lamella that has a phase-separated microdomain at its surface is formed when a copolymer film is spin coated from ethyl acetate. This process can be divided into two steps: The copolymer first self-assembles into square lamellar micelles with an incomplete crystalline PEG core. In the subsequent process of solvent evaporation, phase separation between PS and non-crystalline PEG attached at the chain-folded PEG surface takes place, which results in phase-separated microdomains being formed at the lamellar surface. /ks

Y. Han et al., *Macromol. Rapid Commun.*, DOI: 10.1002/marc.200800210

## Resin Coating

A wide range of solids, gases or liquid compounds can be encapsulated within a surrounding polymer (coating) to form microcapsules, which can then be exploited for various applications. In spite of extensive synthesis involving interfacial polymerization reactions, only H-Y Chaos group has in its 1991 patent reported the use of epoxy resins, which present particularly attractive



mechanic properties, for the formation of such capsules. Now, Giamberini and co-workers have exploited interfacial polymerization between epoxy resins and monomers featuring carboxylic acid groups ( $-\text{COOH}$ ) to form a novel coating for microcapsules. The morphology or the surface can be affected – for example, increasing the number of carboxylic acid groups led to the formation of cross-linked surfaces. /ap

M. Giamberini et al., *Polym. Int.*, DOI: 10.1002/pi.2438

## In Brief

### Recyclable Biobased Plastics

Readily recyclable biobased plastics were successfully designed and synthesized by the thermally reversible DA reaction and utilizing furyl-telechelic poly(butylene succinate) prepolymers. /ct

N. Yoshie et al., *Macromol. Biosci.*, DOI:10.1002/mabi.200800078

### Magnetically Controlled Drug Release

A novel core/shell nanocarrier is presented with a drug-containing silica core surrounded by a magnetic nanoshell that displays ultrafast response and sensitivity upon exposure to a magnetic field and allows controlled drug release. /ct

S. Y. Chen et al., *Adv. Mater.*, DOI: 10.1002/adma.200800193

### Introducing the Nanograin Composite Model

The nanograin composite model is developed to model/analyze the ac-impedance response of equiaxed polycrystalline electroceramics, and appears to be suitable for grain sizes in the range of 10–100 nm. /gk

T. O. Mason et al., *J. Am. Ceram. Soc.* **2008**, 91, 1733.

### Enzyme-Responsive Nanoparticle Assembly for Imaging and Sensing

Recent advances in the use of enzyme-responsive assembly of nanoparticles that lead to environment-dependent signal generation for sensing and imaging of biological processes are discussed by Ghadiali and Stevens in upcoming Special Issue on Nanoparticles from *Advanced Materials*. /lms

J. E. Ghadiali et al., *Adv. Mater.* DOI: 10.1002/adma.200703158

### The Power of the Force

Noncovalent forces, despite being relatively weak, play a critical role in creating complex macromolecular structures designed for specific applications. /lw

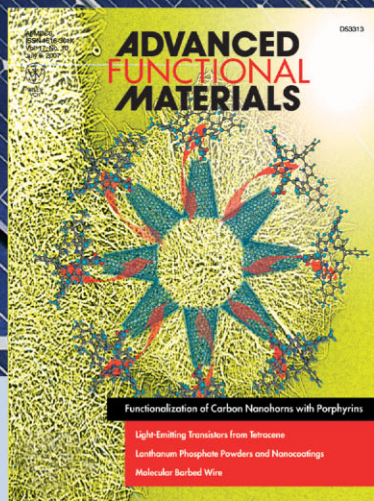
M. Fujiki et al., *J. Polym. Sci. Part A: Polym. Chem.*, DOI: 10.1002/pola.22762

### How to Improve Polymer Solar Cells Performance

Y. Yang and coworkers provide with their publication in *Advanced Functional Materials* a deeper understanding of how the mixed solvent approach leads to an optimized morphology formation in polymer solar cells and state the unique role of the additive with its relevant parameters such as solubility and vapor pressure. /ks

Y. Yang et al., *Adv. Funct. Mater.* **2008**, 18, 1783

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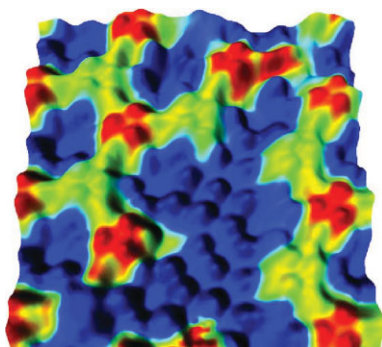
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## Imaging Gallium Nanocluster Arrays on Silicon

The commercial relevancy of the Si(111)- $7 \times 7$  surface for a range of electronics applications makes the recent discovery that certain materials self-assemble into nanoclusters on that surface of interest. Researchers at Northwestern University report in *Small* on the imaging of gallium nanocluster arrays on Si(111)- $7 \times 7$ . Ultrahigh vacuum scanning tunnelling microscopy and differential tunnelling



conductance mapping are used to correlate the topography of the arrays with their local density of states, and demonstrate the presence of surface charge redistribution. This redistribution results in distinct regions of increased differential tunnelling conductance that connect adjacent gallium nanoclusters in the arrays. This atomic-scale knowledge of the electronic properties of nanocluster arrays on silicon is likely to impact further fundamental studies and possible nano-electronic device applications./gk

M. C. Hersam et al., *Small* **2008**, 4, 915.

## Melt-Blending or Solution-Sonication: Preparation of ABS Nanocomposites

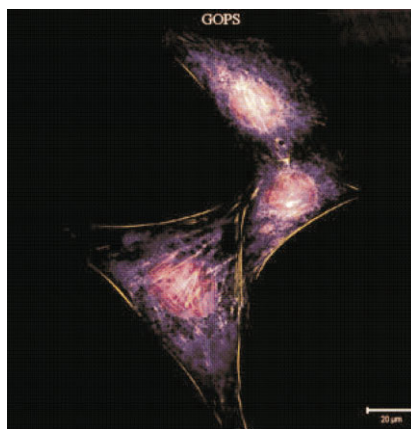
Polymer clay nanocomposites can be obtained using different approaches. Melt blending is commonly used because it does not require the use of an organic solvent, however high temperatures and shear stresses can lead to thermal degradation of the organic surfactant in the clay and possibly to a reduction in the aspect ratio of the layered silicate. The use of sonication

during the solution intercalation process avoids these problems. M. Modesti and coworkers carried out a detailed comparison study using ABS/clay nanocomposites containing an imidazoliumsalt-modified montmorillonite. Morphological, mechanical and thermal properties of the composites have been investigated by X-ray diffraction, TEM, dynamic-mechanical analyses, thermal gravimetric analyses, and by fluorescence spectroscopy (FS) of optical probes. The data clearly show that, for the system studied, solution-intercalation is more effective at dispersing and improving mechanical properties than MB. /ks

M. Modesti et al., *Polym. Adv. Technol.*, DOI: 10.1002/pat.1172

## Enhanced Osteoblast Adhesion to Epoxide-Functionalized Surfaces

Microstructuring of biomaterials has become an important field of research, e.g. the creation of surface patterns on biomaterials in order to control protein and cell interactions. In their recent work K. D. Jandt et al. succeed in functionalizing glass substrates with an epoxide



monolayer that show protein-binding properties. These cell-binding properties are compared with the generally applied extracellular matrix (ECM) proteins and it can be observed that epoxide-functionalized SAM performs better than ECM gel. This provides new routes for very cost-effective systems that improve biocompatibility as well as exciting, new methodologies to control and direct cell adhesion. /ct

K. D. Jandt et al., *Adv. Funct. Mater.*, DOI: 10.1002/adfm.200701491

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