

Soft Matter

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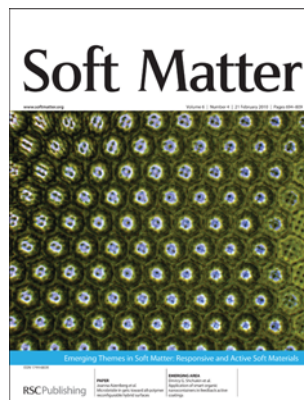
IN THIS ISSUE

ISSN 1744-683X CODEN SMOABF 6(4) 694–810 (2010)



Cover

See W. Wu *et al.*, pp. 739–742. A schematic of a biomimetic microvascular network that mimics ivy leaf venation; different colors denote microchannels of varying diameter. (Image by W. Wu and J.A. Lewis). Image reproduced by permission of Jennifer A. Lewis from *Soft Matter*, 2010, **6**, 739.



Inside cover

See P. Kim *et al.*, pp. 750–755. A microbristle–hydrogel hybrid surface exhibiting dynamically changing surface patterns upon wetting/drying. Image reproduced by permission of Joanna Aizenberg from *Soft Matter*, 2010, **6**, 750.

EDITORIAL

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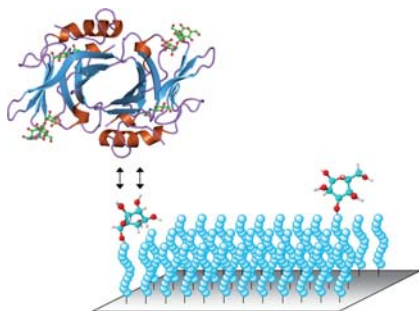
Emerging themes in soft matter: responsive and active soft materials

Anna C. Balazs and Julia M. Yeomans

This theme issue of *Soft Matter* focuses on the emerging theme of responsive and active materials. It covers a range of research looking into “smart” materials that are capable of producing a global behavior in response to a local signal.

HIGHLIGHTS

705



Smart bioactive surfaces

Erik Wischerhoff, Nezha Badi, Jean-François Lutz* and André Laschewsky*

This highlight discusses the field of synthetic bioactive surfaces. Different types of man-made materials capable of interacting with biological objects (*e.g.* proteins, viruses, bacteria or cells) are analyzed and discussed.

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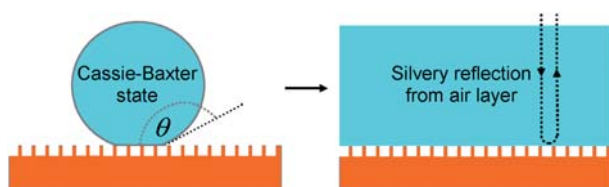
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HIGHLIGHTS

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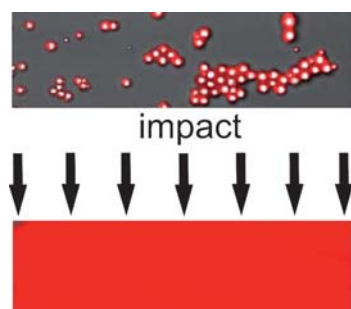
**Immersed superhydrophobic surfaces: Gas exchange, slip and drag reduction properties**

Glen McHale,* Michael I. Newton and Neil J. Shirtcliffe

Immersion of some materials possessing superhydrophobic surfaces results in persistent surface-retained air-films. This provides a vapour-liquid interface allowing underwater respiration/gas exchange and modification of flow patterns inducing drag reduction.

EMERGING AREA

720

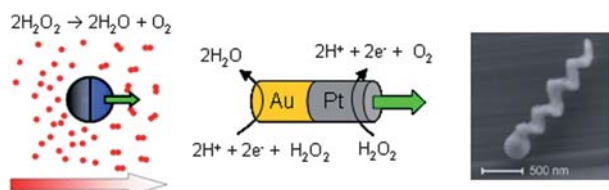
**Application of smart organic nanocontainers in feedback active coatings**

Dmitry G. Shchukin,* Dmitry O. Grigoriev and Helmuth Möhwald

Smart organic nanocontainers possessing the ability to release various encapsulated materials in a controlled way can be employed to introduce a new family of feedback active multifunctional coatings for biomedical and protection applications. These coatings have rapid feedback activity in response to changes of a mechanical and chemical nature in local environment.

REVIEW

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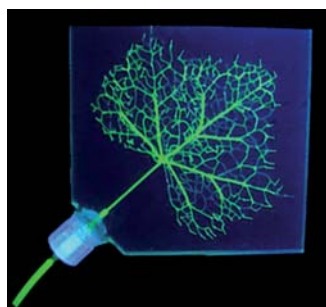
**In pursuit of propulsion at the nanoscale**

Stephen J. Ebbens and Jonathan R. Howse*

The potential of novel self-propelling nano and micro scale devices to be used to transport small scale components and perform biological transport tasks is reviewed.

COMMUNICATION

739

**Direct-write assembly of biomimetic microvascular networks for efficient fluid transport**

Willie Wu, Christopher J. Hansen, Alejandro M. Aragón, Philippe H. Geubelle, Scott R. White and Jennifer A. Lewis*

We report a novel technique for fabricating complex biomimetic microvascular networks with engineered flow optimization using direct-write assembly.

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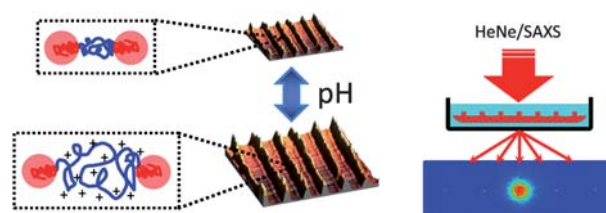
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Quantifying hydrogel response using laser light scattering

Joshua M. G. Swann, Wim Bras, Jonathan R. Howse,*
Paul D. Topham* and Anthony J. Ryan

For the first time, laser light scattering has been proven to be an inexpensive and effective analytical tool for measuring quantitatively hydrogel response on the microscopic scale.



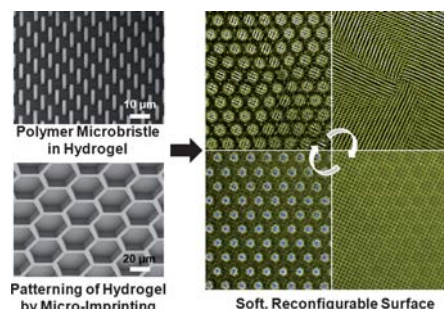
750



Microbristle in gels: Toward all-polymer reconfigurable hybrid surfaces

Philseok Kim, Lauren D. Zarzar, Xuanhe Zhao,
Alexander Sidorenko and Joanna Aizenberg*

The integration of a soft, polymeric microbristle with a patterned hydrogel muscle enables the fabrication of responsive, reversibly actuated surface structures that easily reconfigure into intricate geometries upon hydrogel's swelling/contraction.

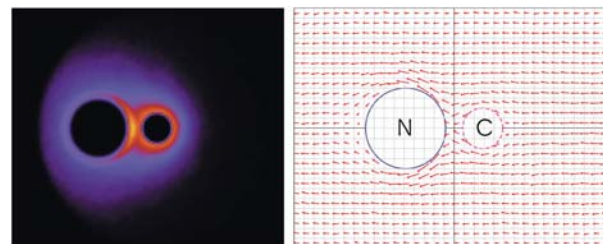


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Swimming upstream: self-propelled nanodimer motors in a flow

Yu-Guo Tao* and Raymond Kapral*

Chemically-powered self-propelled nanodimer motors swim upstream when confined in a square channel within which a Poiseuille-like fluid flow is present.

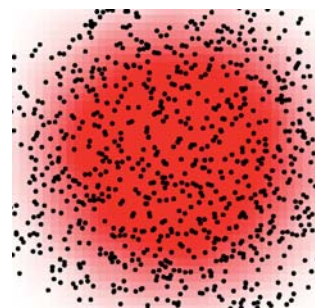


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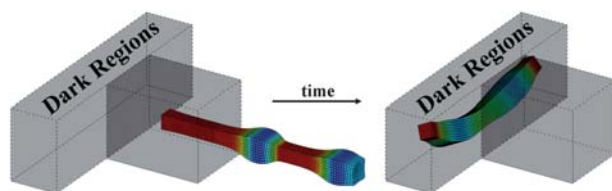
A coarse-grained model of targeted drug delivery from responsive polymer nanoparticles

Ernest W. Durbin and Gavin A. Buxton*

A coarse-grained computer model is used to capture the dynamics of a responsive core-shell nanoparticle, and the targeted release of an encapsulated drug.



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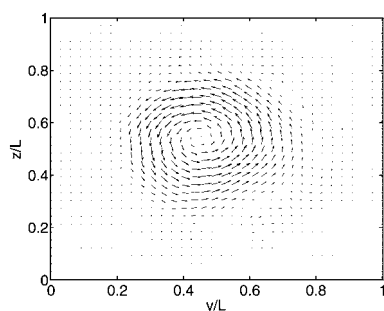


Designing autonomously motile gels that follow complex paths

Pratyush Dayal, Olga Kuksenok and Anna C. Balazs

We use non-uniform illumination to direct the movement of chemo-responsive polymer gels along complex paths, guiding them to bend, reorient and turn.

774



Hydrodynamics of non-homogeneous active gels

D. Marenduzzo and E. Orlandini

We study numerically the hydrodynamics of active fluids with spatially inhomogeneous activity. Extensile fluids form spontaneously rotating vortices which can synchronise, whereas contractile ones spontaneously nucleate defects.

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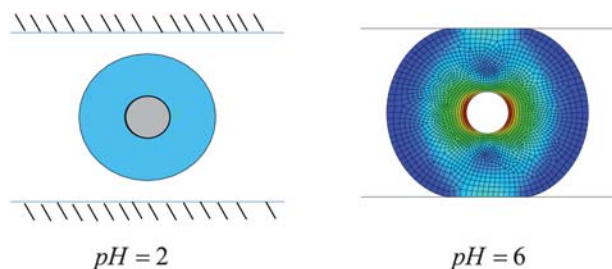


Liquid crystalline polymer cantilever oscillators fueled by light

Svetlana Serak, Nelson Tabiryan,* Rafael Vergara, Timothy J. White, Richard A. Vaia and Timothy J. Bunning*

Cantilevers composed of azobenzene liquid crystal polymer networks oscillate at frequencies as high as 270 Hz when exposed to laser or solar sources.

784



A theory of constrained swelling of a pH-sensitive hydrogel

Romain Marcombe, Shengqiang Cai, Wei Hong, Xuanhe Zhao, Yuri Lapusta and Zhigang Suo*

A nonlinear field theory is described for pH-sensitive hydrogels undergoing inhomogeneous deformation. The theory is implemented as a finite element method in the commercial software ABAQUS.

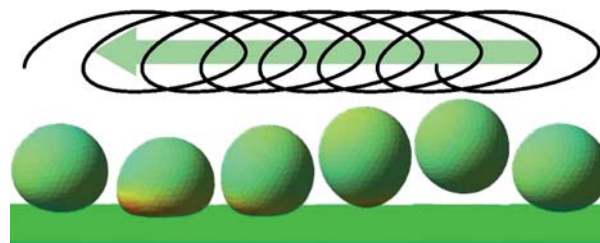
PAPERS

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Modeling magnetic microcapsules that crawl in microchannels

Hassan Masoud and Alexander Alexeev*

Using computational modeling, we examine how fluid-filled magnetic microcapsules in a circulating magnetic field can be arranged to propel themselves along sticky surfaces and, in this manner, could be harnessed as microscopic transport vehicles in microfluidic devices.

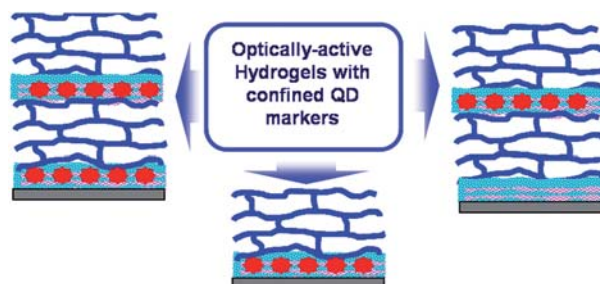


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pH-responsive photoluminescent LbL hydrogels with confined quantum dots

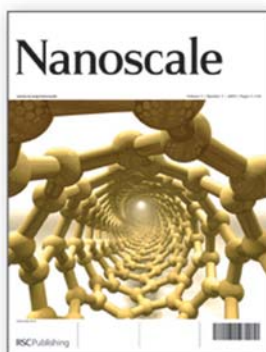
Eugenia Kharlampieva, Veronika Kozlovskaya, Oleksandra Zavgorodnya, George Daniel Lilly, Nicholas A. Kotov and Vladimir V. Tsukruk*

We report on photoluminescent hybrid materials with quantum dots immobilized in organized manner fabricated by spin-assisted layer-by-layer assembly. The system undergoes reversible changes in photoluminescent intensity in response to pH variations and, therefore, might be developed into or pH- or chemical sensors.



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