# Soft Matter

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## **IN THIS ISSUE**

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#### Inside cover

See Daeyeon Lee *et al.*, pp. 6604–6617. Image reproduced by permission of Daeyeon Lee from *Soft Matter*, 2013, **9**, 6604.

## EDITORIAL

#### 6564

## Soft Matter Emerging Investigators themed issue

Michael Rubinstein and Liz Dunn

This themed issue of Soft Matter highlights the work of emerging investigators in the field of soft matter. Professor Michael Rubinstein, Chair of the Editorial Board, and Liz Dunn, Editor, introduce the issue.

## HIGHLIGHTS

#### 6565

## Buckled colloidal monolayers connect geometric frustration in soft and hard matter

Yair Shokef,\* Yilong Han, Anton Souslov, A. G. Yodh and Tom C. Lubensky

Packing of colloidal spheres in buckled monolayers generates effective antiferromagnetic interactions and unravels the single-particle dynamics in geometrically frustrated matter.





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# Soft Matter

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## **HIGHLIGHTS**

## 6571

## Electrochemical biocomputing: a new class of molecular-electronic logic devices

Yongmei Jia, Ruixue Duan, Fan Hong, Boya Wang, Nannan Liu and Fan Xia\*

In this highlight, we review bioelectronic computing devices based on DNA, enzymes, and biofuel cells.

## 6578

## Advancements and challenges of patterning biomolecules with sub-50 nm features

Helen Tran, Kato L. Killops and Luis M. Campos\*

The blueprints to pattern biomolecules at the nanoscale comprise macromolecular chemistry and modern tools for fabrication and characterization – advances and challenges are highlighted.



## 6587

## Structure and swelling of polymer networks: insights from NMR

Kay Saalwächter,\* Walter Chassé and Jens-Uwe Sommer

Recent advances in the NMR characterization of elastomers are reviewed, specifically addressing new insights into the relationship between NMR observables and thermodynamic properties, as reflected in the swelling behavior.



## **EMERGING AREA**

#### 6594

## The influence of shape anisotropy on the microstructure of magnetic dipolar particles

Sofia Kantorovich,\* Elena Pyanzina and Francesco Sciortino

In the present contribution we study theoretically the ground states of magnetic rods and ellipsoids with point dipoles and investigate how the shape anisotropy affect the microstructure of anisotropic particles in isotropic phase.





<sup>▲</sup> K<sub>B</sub>T/U

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## Amphiphilic Janus particles at fluid interfaces

Ankit Kumar, Bum Jun Park, Fuquan Tu and Daeyeon Lee\*

This review highlights recent advances in the application of amphiphilic Janus particles as colloid surfactants and in our understanding of the behaviour of Janus particles at fluid interfaces, with particular emphasis on the configuration and interaction of these particles.

## Weak adhesion at the mesoscale: particles at an interface

Deepak Kumar, S. Bhattacharya and Shankar Ghosh\*

In this review we explore adhesion, a phenomenon commonly called sticking, in the mesoscopic scale. Though ubiquitous in nature, it has resisted generic explanations or understanding and remains relatively unexplored. For in this scale neither the continuum nor molecular approach works well. The regime is dominated by complex behavior like ageing of the adhesion strength and dynamical instabilities.

## Grain growth and grain boundary dynamics in colloidal polycrystals

Shreyas Gokhale, K. Hima Nagamanasa, Rajesh Ganapathy<sup>\*</sup> and A. K. Sood

In this review, we highlight contributions from colloid experiments at the single-particle as well as grain network length scales that have enriched our understanding of grain growth in polycrystalline materials.

6634

![](_page_3_Picture_14.jpeg)

 $\frac{\partial^2 U}{\partial x^2} \neq 0$ 

 $1/\Xi$ 

6645

![](_page_3_Figure_16.jpeg)

## A review of fundamental properties and applications of polymer–graphene hybrid materials

Alison Y. W. Sham and Shannon M. Notley\*

Graphene research is at the interface of many distinct disciplines of science and physics with the potential to address the great current global challenges.

## **REVIEWS**

#### 6654

## Understanding diluted dispersions of superparamagnetic particles under strong magnetic fields: a review of concepts, theory and simulations

Jordi Faraudo,\* Jordi S. Andreu and Juan Camacho

In this review, we discuss recent theoretical advances in the theory and simulation of diluted dispersions of superparamagnetic nanoparticles and colloids under strong magnetic fields.

## 6665

## Cell confinement: putting the squeeze on the nucleus

Marie Versaevel, Maryam Riaz, Thomas Grevesse and Sylvain Gabriele\*

Microsystems open up new experimental avenues for studying nuclear confinement in mammalian cells.

![](_page_4_Picture_10.jpeg)

## 6677

## Self-assembly of nanoparticles adsorbed on fluid and elastic membranes

Anđela Šarić and Angelo Cacciuto\*

In this paper we review recent numerical and theoretical developments of particle self-assembly on fluid and elastic membranes and compare them to available experimental realizations.

![](_page_4_Figure_15.jpeg)

#### 6696

## Hierarchical simulations of hybrid polymer-solid materials

Karen Johnston and Vagelis Harmandaris\*

This article reviews simulation approaches to polymer–solid interfacial systems for different levels of description, from quantum to atomistic up to coarse-grained level.

![](_page_4_Figure_20.jpeg)

#### **REVIEWS**

## 6711

![](_page_5_Picture_3.jpeg)

## Shape anisotropic colloids: synthesis, packing behavior, evaporation driven assembly, and their application in emulsion stabilization

Venkateshwar Rao Dugyala, Santosh V. Daware and Madivala G. Basavaraj\*

Influence of particle shape: self-assembly, flow and packing behavior, interfacial behavior and emulsion stabilization.

![](_page_5_Picture_8.jpeg)

## The physics of membrane tubes: soft templates for studying cellular membranes

Aurélien Roux\*

Lipid membranes under shear or tension can form surprising, cylindrical structures called membrane tubes with diameters varying between a few hundreds of nanometers to a few tens of nanometers.

#### **TUTORIAL REVIEW**

## 6737

![](_page_5_Figure_14.jpeg)

## Tunable and dynamic soft materials for threedimensional cell culture

Matthew S. Rehmann and April M. Kloxin\*

Dynamic biomaterials for cell culture can be used to mimic temporal changes that occur in the native extracellular matrix.

## COMMUNICATIONS

6747

![](_page_5_Picture_20.jpeg)

## Fabrication and characterization of emulsions with pH responsive switchable behavior

Ashok R. Patel,<sup>\*</sup> Ellen Drost, Jack Seijen ten Hoorn and Krassimir P. Velikov<sup>\*</sup>

We report the fabrication of emulsions with a pH responsive switchable property. Emulsions stabilized using two biopolymers (xanthan gum and shellac) showed immediate destabilization (flocculation without coalescence) at acidic pH but switched back to the stable state when the pH was neutralized.

COMMUNICATIONS

Thomas E. Waller, Nick J. Plant, Aline F. Miller and Gabriel Cavalli\*

Site-specific, covalent incorporation of Tus, a DNA-binding protein, on ionic-complementary

self-assembling peptide hydrogels using transpeptidase Sortase A as a conjugation tool

The site-specific conjugation of DNA-binding protein (Tus) to self-assembling peptide FEFEFKFKK was demonstrated.

## 6757

## Emergent coherent states and flow rectification in active magnetic colloidal monolayers

Gasper Kokot, Alexey Snezhko\* and Igor S. Aranson

We report on an emergent coherent behavior of a ferromagnetic colloidal monolayer suspended at a liquid– air interface and powered by a single-axis alternating inplane magnetic field.

![](_page_6_Picture_9.jpeg)

#### PAPERS

#### 6761

## Frustration and packing in curved-filament assemblies: from isometric to isomorphic bundles

Gregory M. Grason\*

Intrinsic curvature of helical filaments, such as bacterial flagella, frustrates perfect packing in self-assembled bundles.

#### 6773

## Bijel reinforcement by droplet bridging: a route to bicontinuous materials with large domains

Jessica A. Witt, Daniel R. Mumm and Ali Mohraz\*

Droplet bridging results in hierarchical microstructure and contributes to gel-like rheology in bijels.

![](_page_6_Picture_19.jpeg)

![](_page_6_Figure_20.jpeg)

![](_page_6_Picture_21.jpeg)

![](_page_7_Picture_3.jpeg)

![](_page_7_Figure_4.jpeg)

![](_page_7_Picture_6.jpeg)

## Tuning colloidal association with specific peptide interactions

Alia P. Schoen, Bob Hommersom, Sarah C. Heilshorn and Mirjam E. Leunissen\*

Leucine zippers peptides are used to achieve specific association of micron-sized building blocks, which can be controlled by titrating in freely soluble peptide binding partners offering specific and tunable control over the strongly multivalent particle interactions compared to global inputs such as temperature, pH, or ionic strength.

## Cluster and reentrant anomalies of nearly Gaussian core particles

Daniele Coslovich\* and Atsushi Ikeda

Reentrant behavior and clustering coexist in fluids of ultrasoft particles and lead to multiple structural and dynamic anomalies.

## Localization of deformation in thin shells under indentation

Alice Nasto, Amin Ajdari, Arnaud Lazarus, Ashkan Vaziri and Pedro M. Reis $\ensuremath{^{\ast}}$ 

We perform a hybrid experimental and numerical study of the localization of deformation in thin spherical elastic shells under indentation.

## 6804

![](_page_7_Figure_17.jpeg)

## Static magnetic fields enhance lipid order in native plant plasma membrane

Danny Poinapen, Laura Toppozini,\* Hannah Dies, Daniel C. W. Brown and Maikel C. Rheinstädter\*

Static magnetic fields enhanced lipid order in native plant plasma membrane.

## 6814

# Structure and mechanical response of protein hydrogels reinforced by block copolymer self-assembly

Matthew J. Glassman and Bradley D. Olsen\*

Parameters controlling the structure and mechanics of shear thinning in hybrid block copolymer hydrogels are investigated, revealing important principles for maximizing their responsive reinforcement.

## 6824

Secondary convection due to second normal stress differences: A new mechanism for the mass transport of solutes in pressure-driven flows of concentrated, non-colloidal suspensions

Arun Ramachandran\*

Secondary currents due to the non-Newtonian rheology of suspensions can enhance solute mass transfer rates in suspensions flowing through conduits.

![](_page_8_Figure_10.jpeg)

![](_page_8_Figure_11.jpeg)

![](_page_8_Picture_12.jpeg)

Without secondary currents

![](_page_8_Picture_14.jpeg)

With secondary currents

## 6841

## How stable are amphiphilic dendrimers at the liquid–liquid interface?

D. L. Cheung and P. Carbone

Using molecular dynamics simulations the adsorption strength of dendrimers at a model liquid–liquid interface has been found to depend on the functionality of both the exterior and interior of the dendrimer.

![](_page_8_Figure_20.jpeg)

![](_page_8_Picture_21.jpeg)

![](_page_8_Picture_22.jpeg)

Core-shell

Janus

#### 6851

## Do hierarchical structures assemble best via hierarchical pathways?

Thomas K. Haxton and Stephen Whitelam\*

Using computer simulation, we broadly vary interaction strengths and assembly pathways to optimize the assembly of a simple example of a hierarchical structure.

![](_page_8_Picture_29.jpeg)

#### 6862

![](_page_9_Picture_3.jpeg)

6867

![](_page_9_Figure_5.jpeg)

## Modelling unidirectional liquid spreading on slanted microposts

Andrea Cavalli,\* Matthew L. Blow and Julia M. Yeomans\*

We model the unidirectional spreading of liquid on slanted microposts.

## Generating an *in situ* tunable interaction potential for probing 2-D colloidal phase behavior

Di Du, Dichuan Li, Madhuri Thakur and Sibani Lisa Biswal\*

We present a novel method to tune the 2-D interaction potential from  $5k_{\rm B}T$  to  $40k_{\rm B}T$  in situ between micron-sized superparamagnetic colloids.

![](_page_9_Figure_12.jpeg)

#### 6890

![](_page_9_Picture_14.jpeg)

## Polydisperse homopolymer grafts stabilize dispersions of nanoparticles in a chemically identical homopolymer matrix: an integrated theory and simulation study

Tyler B. Martin and Arthi Jayaraman\*

This computational study describes the effect of polydispersity in the grafted polymers in reducing the mid-range attraction in the effective interactions between polymer grafted particles in a polymer matrix, thereby stabilizing particle dispersion.

## Morphological transitions in polymer vesicles upon bilayer swelling with small hydrophobic molecules in water

Christopher D. J. Parmenter, Rong Chen, David L. Cheung<sup>\*</sup> and Stefan A. F. Bon<sup>\*</sup>

When unilamellar polymer vesicles dispersed in water made from blockcopolymers are exposed to small hydrophobic molecules they can undergo morphological transitions, hereby losing their original simple bilayer structure.

#### 6897

## Polymer–surfactant complexation as a generic route to responsive viscoelastic nanoemulsions

Juntae Kim, Yongxiang Gao, Casey Hebebrand, Elke Peirtsegaele and Matthew E. Helgeson\*

We demonstrate the use of polymer–surfactant solution self-assembly as a means to impart thermoreversible viscoelasticity in nanoemulsions without compromising their colloidal stability.

![](_page_10_Figure_6.jpeg)

#### 6911

## Microparticles confined to a nematic liquid crystal shell

Mohamed Amine Gharbi, David Seč, Teresa Lopez-Leon, Maurizio Nobili, Miha Ravnik, Slobodan Žumer and Christophe Blanc\*

Due to the spherical topology, microspheres trapped to a nematic liquid crystal shell spontaneously combine with topological defects and form complex patterns. Such phenomena could be used to fabricate spherical colloids of high but controlled valency.

#### 6921

## Structure and rheology of branched polyamide 6 polymers from their reaction recipe

E. van Ruymbeke,\* J. J. M. Slot, M. Kapnistos and P. A. M. Steeman

The structure and rheology of randomly branched polyamide melts, in particular that of branched polyamide 6, are predicted on the basis of their initial reaction recipe.

#### 6936

## Enhanced rigidity and rupture strength of composite hydrogel networks of bio-inspired block copolymers

Wolf H. Rombouts, Mathieu Colomb-Delsuc, Marc W. T. Werten, Sijbren Otto, Frits A. de Wolf and Jasper van der Gucht\*

Self-assembled composite networks of silk-like fibers in a soft physical network show enhanced modulus and toughness.

![](_page_10_Picture_19.jpeg)

![](_page_10_Figure_20.jpeg)

![](_page_10_Figure_21.jpeg)

![](_page_10_Figure_22.jpeg)

![](_page_11_Figure_2.jpeg)

![](_page_11_Figure_3.jpeg)

![](_page_11_Figure_5.jpeg)

6978

![](_page_11_Figure_7.jpeg)

![](_page_11_Figure_8.jpeg)

## Inhomogeneities and local chain stretching in partially swollen networks

Walter Chassé,\* Sandra Schlögl, Gisbert Riess and Kay Saalwächter\*

Based upon a robust low-field proton NMR method, affine deformation behavior of polymer network chains upon swelling is found in the high-swelling range. Using a backextrapolation procedure, the "phantom reference network" is established as a measure of the true bulk crosslink density. Possible origins of the strongly subaffine behavior and the role of defects in the low-swelling range are discussed.

## Complexation between weakly basic dendrimers and linear polyelectrolytes: effects of grafts, chain stiffness, and pOH

Thomas Lewis, Gunja Pandav, Ahmad Omar and Venkat Ganesan\*

The complexation between charged, semiflexible polyelectrolytes and grafted dendrimers are studied using a combination of polymer self-consistent field theory and Monte Carlo simulations.

# Brownian dynamics simulations in magnetorheology and comparison with experiments

Juan Pablo Segovia-Gutiérrez, Juan de Vicente, Roque Hidalgo-Álvarez and Antonio M. Puertas\*

The rheological behaviour of unsheared magnetorheological fluids is studied using Brownian dynamics simulations and experiments.

## Understanding and modulating the competitive surface-adsorption of proteins through coarsegrained molecular dynamics simulations

Pol Vilaseca, Kenneth A. Dawson and Giancarlo Franzese\*

It is now well accepted that cellular responses to materials in a biological medium reflect greatly the adsorbed biomolecular layer, rather than the material itself. We study the competitive protein adsorption on a surface (Vroman effect), finding a complex behavior (including "cooperative" adsorption) that can be understood, controlled and inverted.

## 6986

# Hybrid gelation processes in enzymatically gelled gelatin: impact on nanostructure, macroscopic properties and cellular response

Franziska Bode, Marcelo Alves da Silva, Paul Smith, Christian D. Lorenz, Seth McCullen, Molly M. Stevens and Cécile A. Dreiss\*

Enzymatic cross-linking of gelatin (left) proceeds through cluster growth (red); when combined with physical gelation, clusters are constrained by triple-helices (black), yielding a more ordered and efficient network, favouring cell proliferation.

## 7000

## Dynamical behavior of disordered spring networks

M. G. Yucht, M. Sheinman and C. P. Broedersz\*

We study the dynamic rheology of disordered spring networks in a viscous medium using numerics and analytical theory.

![](_page_12_Picture_10.jpeg)

![](_page_12_Picture_11.jpeg)

![](_page_12_Picture_12.jpeg)

#### 7007

# Thermoresponsive behavior of amphiphilic diblock co-oligomers of ethylene glycol and styrene in aqueous solution

Meiliana Siauw, Paul A. FitzGerald, Brian S. Hawkett and Sébastien Perrier\*

We report the thermoresponsive behavior in aqueous solution of amphiphilic diblock co-oligomers of ethylene glycol (EG) and styrene (S) obtained by reversible addition fragmentation chain transfer (RAFT) polymerization ( $mPEG_{16}-b-PS_2$ ,  $mPEG_{16}-b-PS_4$  and  $mPEG_{16}-b-PS_6$ ).

## 7016

## Discretizing elastic chains for coarse-grained polymer models

Elena F. Koslover\* and Andrew J. Spakowitz\*

We present a novel approach for coarse-graining polymer models by mapping to a discretized, stretchable, shearable wormlike chain suitable for use in simulations targeting large length-scale phenomena.

![](_page_12_Picture_21.jpeg)

![](_page_12_Figure_22.jpeg)

![](_page_13_Figure_3.jpeg)

## Quiescent bilayers at the mica-water interface

Francesca Speranza, Georgia A. Pilkington, Thomas G. Dane, Philip T. Cresswell, Peixun Li, Robert M. J. Jacobs, Thomas Arnold, Laurence Bouchenoire, Robert K. Thomas and Wuge H. Briscoe<sup>\*</sup>

emulsions and catastrophic inversion

Duyang Zang and Paul S. Clegg\*

emulsion as the shear rate is increased.

Under *quiescent* conditions,  $C_n$ TAB surfactants form *disordered* or *tilted bilayers* with a maximum layer thickness at  $\sim$ 1 cmc.

Relationship between high internal-phase Pickering

A sample containing toluene, water and silica nanoparticles proceeds from a water-in-oil emulsion with surplus water via a high internal-phase emulsion (HIPE) to an oil-in-water

## 7042

![](_page_13_Picture_8.jpeg)

7049

![](_page_13_Figure_10.jpeg)

## Control and manipulation of microfluidic flow *via* elastic deformations

Douglas P. Holmes,\* Behrouz Tavakol, Guillaume Froehlicher and Howard A. Stone

We utilize elastic deformations *via* mechanical actuation to control and direct fluid flow within a flexible microfluidic device.

7054

![](_page_13_Picture_15.jpeg)

## Light induced flows opposing drainage in foams and thin-films using photosurfactants

Eloise Chevallier, Arnaud Saint-Jalmes, Isabelle Cantat, François Lequeux and Cécile Monteux\*

We study the influence of UV light on the drainage flows of foams and thin-liquid films stabilized by photoswitchable azobenzene surfactants, whose shape and hydrophobicity can be modified using UV illumination.

## 7061

## Growth of ring-shaped microtubule assemblies through stepwise active self-organisation

Daisuke Inoue, Arif Md. Rashedul Kabir, Hiroyuki Mayama, Jian Ping Gong, Kazuki Sada and Akira Kakugo\*

Stepwise active self-organisation of microtubules offers a means to prolong the growth of the ring-shaped microtubule assemblies.

## 7069

## A finite-size scaling study of wedge filling transitions in the 3D Ising model

José Manuel Romero-Enrique,\* Álvaro Rodríguez-Rivas, Luis F. Rull and Andrew O. Parry

We analyse theoretically and by computer simulations the finite-size scaling at the critical wedge filling transition for the 3D Ising model.

![](_page_14_Figure_10.jpeg)

![](_page_14_Figure_11.jpeg)

## 7076

# Fragility and glass transition temperature of polymer confined under isobaric and isochoric conditions

Chuan Zhang and Rodney D. Priestley\*

The impact of isobaric and isochoric confinement on the dynamic fragility as well as the glass transition temperature is explored for a polymeric glass-former.

## 7086

## Monte Carlo simulation of thermo-responsive charged nanogels in salt-free solutions

Manuel Quesada-Pérez\* and Alberto Martín-Molina

When charged thermo-responsive nanogels shrink upon heating, they form a hollow sphere, with the charged beads concentrated on the inner and outer surfaces, and some counterions enclosed in the inner space.

![](_page_14_Figure_20.jpeg)

![](_page_14_Figure_21.jpeg)

![](_page_15_Picture_3.jpeg)

## Calcium mediated interaction of calf-thymus DNA with monolayers of distearoylphosphatidylcholine: a neutron and X-ray reflectivity study

Aleksandra P. Dabkowska, Jonathan P. Talbot, Leide Cavalcanti, John R. P. Webster, Andrew Nelson, David J. Barlow, Giovanna Fragneto<sup>4</sup> and M. Jayne Lawrence\*

X-ray and neutron reflection studies have been combined to study the interaction of DNA with monolayers of distearoylphosphatidylcholine formed at the air-water interface in the presence of 20 mM Ca2+ ions.

#### 7106 1E-3 1E-5 (S/cm) (S/cm Conductivity Conductivity 1E-6 1E-5 1E-7 1E-1E-6 Random Antialigned Aligned degenerate Aligned Random Antialigned Aligned

## Understanding anisotropic transport in selfassembled membranes and maximizing ionic conductivity by microstructure alignment

Pawel W. Majewski, Manesh Gopinadhan and Chinedum O. Osuji\*

Soft mesophases of lamellae and hexagonally packed cylindrical microdomains subjected to magnetic field alignment demonstrate unexpectedly strong enhancement of ionic conductivity by factors of 2.5 and 20 over nonaligned materials.

## Modulating the structure and interactions of lipid-peptide complexes by varying membrane composition and solution conditions

Leora Moshe, Gadiel Saper, Or Szekely, Yaniv Linde, Chaim Gilon, Daniel Harries and Uri Raviv\*

We show how solution conditions and membrane compositions dictate the interactions and structures of lipidpeptide complexes.

7127

7117

![](_page_15_Figure_15.jpeg)

ΔED

## Myosin II does it all: assembly, remodeling, and disassembly of actin networks are governed by myosin II activity

Yaron Ideses, Adar Sonn-Segev, Yael Roichman and Anne Bernheim-Groswasser'

Myosin II motors are multi-tasking motors that function both in the assembly, remodeling, and disassembly of actomyosin networks, thereby regulating cytoskeleton dynamics and structure.

## 7138

## Mesoscale mechanics of wood cell walls under axial strain

David C. Adler and Markus J. Buehler\*

Trees and other woody plants are hierarchically structured to achieve a wide range of mechanical properties—necessary for their survival under various and varying loading conditions—with a narrow range of chemical composition.

## 7145

## How deprotonation changes molecular selfassembly – an AFM study in liquid environment

Martin Schreiber, Michael Eckardt, Stefanie Klassen, Holger Adam, Martin Nalbach, Lukas Greifenstein, Felix Kling, Markus Kittelmann, Ralf Bechstein and Angelika Kühnle<sup>\*</sup>

Depending on the pH, Alizarin Red S (ARS) adopts distinctly different adsorption geometries, resulting in different molecular arrangements on the calcite(10.4) surface.

## 7150

## Immiscible lipids control the morphology of patchy emulsions

Lea-Laetitia Pontani,\* Martin F. Haase, Izabela Raczkowska and Jasna Brujic\*

Immiscible lipid mixtures separate into domains on the surface of emulsion droplets and lead to a new class of liquid patchy particles.

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## Micromechanics of temperature sensitive microgels: dip in the Poisson ratio near the LCST

Panayiotis Voudouris, Daniel Florea, Paul van der Schoot and Hans M. Wyss $\ensuremath{^{\ast}}$ 

The full *T*-dependent elastic behavior of pNIPAM particles is measured, revealing a dip in the Poisson ratio near the LCST.

![](_page_16_Figure_21.jpeg)

![](_page_16_Figure_22.jpeg)

![](_page_16_Picture_23.jpeg)

![](_page_16_Picture_24.jpeg)

# 7167

![](_page_17_Figure_4.jpeg)

## Origin of active transport in breast-cancer cells

Diana Goldstein, Tal Elhanan, Maria Aronovitch and Daphne Weihs\*

Particles inside breast-cancer cells are transported among microtubules by thermal-fluctuations, indirect/direct motor interactions, and occasional filament nudging.

## The structure and rheology of sheared model swimmer suspensions

Ignacio Pagonabarraga\* and Isaac Llopis

We carry out a computational study of the rheological response of suspensions of polar and apolar spherical squirmers subject to shear flow.

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![](_page_17_Picture_12.jpeg)

## Phase diagram for a single flexible Stockmayer polymer at zero field

Joan J. Cerdà,\* Pedro A. Sánchez, Christian Holm and Tomàs Sintes

An initial sketch of the conformational phase diagram of a single flexible magnetic filament has been obtained *via* extensive Langevin dynamics simulations. The existence of at least two `*triple points*' and phases with a high degree of anisotropy has been observed.

## 12<sup>th</sup> INTERNATIONAL CONFERENCE

![](_page_18_Picture_2.jpeg)

![](_page_18_Picture_3.jpeg)

![](_page_18_Picture_4.jpeg)

![](_page_18_Picture_5.jpeg)

![](_page_18_Picture_6.jpeg)

## **Organizing Institution**

Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research GmbH

![](_page_18_Picture_9.jpeg)

![](_page_18_Picture_10.jpeg)

29 September-2 October 2013

Henry Ford Building • Freie Universität Berlin

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## Chair of Conference Andreas Lendlein, Institute of Biomaterial Science,

Helmholtz-Zentrum Geesthacht, Teltow

## Topics

## Polymers for Life Sciences

- Drug release systems
- Hydrogels
- Biomimetic materials
- Degradable polymers and polymers from renewable ressources
- Implantable and injectable materials, including scaffolds and particles
- Polymer Therapeutics

## Advanced Structural Polymers

- High-performance polymers for fibres and membranes
- Composites, adhesives, and coatings
- Supramolecular polymeric materials
- Polymer processing
- Polymers for construction chemistry
- Fire-retardants

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- Electro-optics and nonlinear optics
- Dielectric, ferroelectric, and electric applications
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