

SoftMatterWorld Newsletter

the web's foremost resource on soft condensed matter

September 2010, Issue 21

Dear Soft Matter Colleagues,

This month we have shifted our featured research focus to theory, simulation and modeling with the Physics of Soft and Partially Ordered Matter Group from Slovenia. With the beginning of Autumn come conference announcements for the new year.



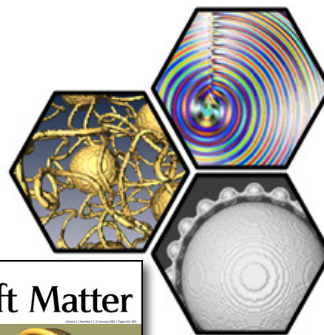
Physics of Soft and Partially Ordered Matter: Theory and Simulation Group

This month we are featuring the Physics of **Soft and Partially Ordered Matter: Theory and Simulation Group** lead by Professor Slobodan Žumer. The group is based out of the University of Ljubljana, Slovenia. The Theory and Simulation group is actually one of two groups within the multi-investigator collaboration: Physics of Soft and Partially Ordered Matter.

Prof. Žumer and his group's research is focused on topics in theoretical soft matter physics, such as colloids, liquid crystals, granular matter, and liquid crystal elastomers. Over the years his research has been featured in some of the world's most prestigious academic journals such as; Nature and Physical Review Letters.

The theoretical approach of the group is strongly linked with experiments from the partner experimental group lead by Prof. Dr. Igor Muševič.

The theoretical approaches include macroscopic phenomenology (Landau-de Gennes,



Leslie-Ericksen, and similar), topology, and microscopic molecular modeling (lattice and off-lattice Monte Carlo).

Top Image: (clockwise from right) - A chiral nematic droplet viewed through cross polars, saturn ring of a particle decorated by small colloidal particles, a "zoo" of disclination lines. *Bottom Left:* An image of nematic colloids entangled by topological defects which was featured on the cover of

the January 2009 issue of Soft Matter

Some of their most recent projects involve;

- Soft composites for optical, electronic, photonic and sensor applications
- Three dimensional assembly of colloidal structures in mesophases.

Together with partners from Jožef Stefan Institute, Prof. Žumer is also the head of a national research program, "Physics of Soft Matter, Surfaces and Nanostructures." A detailed summary of this research program can be found on their website in powerpoint format.

<http://softmatter.fmf.uni-lj.si/main.php>

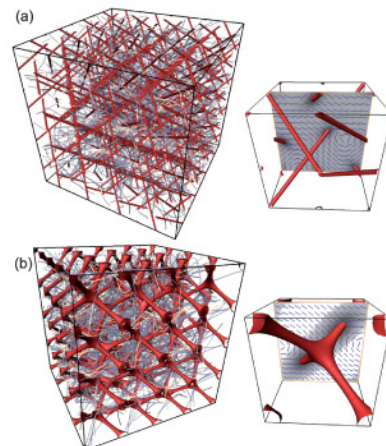
Latest Research

Mesoscopic modelling of colloids in chiral nematics

M. Ravnik, G. P. Alexander, J. M. Yeomans, S. Zumer. *Faraday Discuss.*, 2010, 144, 159–169

In this paper Prof. Žumer and colleagues present numerical modelling of colloidal particles in chiral nematics with cubic symmetry (blue phases) within the framework of the Landau-de Gennes free energy. They discuss the equilibration of the colloidal texture with respect to particle positions and unit cell size of the blue phase. Read more at [RSC publishing](#).

The equilibrium textures of both blue phase I (a) and blue phase II (b) without particles. Defect networks (disclination lines) are shown in red while the director lines and arrangements of double twist cylinders is indicated in grey. Insets show the corresponding conventional unit cells. In blue, the projection of the director on the given plane is visualised. Note the hyperbolic director pattern around the defects characteristic of 1/2 disclination lines.



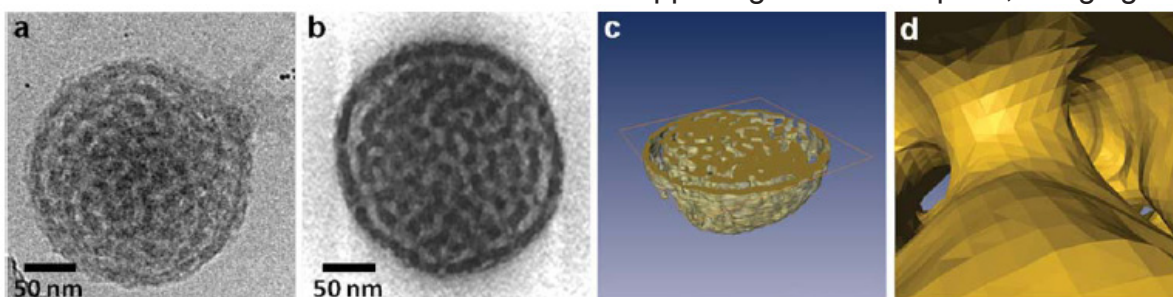
Cryo-electron tomography:

3 dimensional imaging of soft matter

Fabio Nudelman, Gijsbertus de With and Nico A. J. M. Sommerdijk. *Soft Matter*, 2010.

The advent of cryogenic-transmission electron microscopy (cryoTEM) signified a breakthrough in the in-situ imaging of hydrated specimens of biological and synthetic origin allowing their study in a state of preservation that is close to native.

at different tilt angles and then reconstructing the 3D object, revealing detailed information on the structure, morphology or 3D spatial organization of macromolecular assemblies. This information can be coupled to processes happening in the 3D space, bridging the gap



CryoTEM analysis of aggregates of a polynorbornene-based amphiphilic double-comb block copolymer PNOEG-PNGLF. (a) 2D cryoTEM image; (b) cross-section of a 3D SIRT (simultaneous iterative reconstruction technique) reconstructed of the volume containing the particles in (a); (c), (d) visualization of the segmented volume showing (c) a cross section of the aggregate and (d) a view from within the hydrated channels. *Adapted from Parry et al., 23 copyright 2008, with permission from Wiley-VCH Verlag GmbH & Co. KGaA.*

An inherent limitation to cryoTEM, however, is that images are 2D projections of the 3D objects, resulting in the overlapping of multiple features that cannot be discerned. Cryo-electron tomography (cryoET) is essential to overcome this limitation by imaging the specimen

between the structural organization in space and the function or activity of macromolecular complexes at the nanometre scale.

In this research highlight article, the authors describe this technique using examples for real data. Read more at [RSC publishing](#).

XIPS 2010

X-Ray Investigations on Polymer Structure

The 8th International Conference on X-Ray Investigation of Polymer Structure (XIPS 2010), will be held in Wrocław, Poland from. This interdisciplinary conference is a joint collaboration between the University of Bielsko-Biala and Catholic University of Leuven. It aims to bring scientists from chemistry, physics, mathematics and biology to discuss inherent structural properties of soft matter systems such as polymers, colloids, membranes, surfactants, biomaterials and their composites. The registration deadline is September 30th.

Visit the [website](#) to read more.

www.xips2010.ath.bielsko.pl/

Biophysical Society

55th Annual Meeting

The 2011 55th Annual Meeting of the Biophysical Society will be taking place this coming spring on March 5-9 in Baltimore Maryland. The conference will be home to over 120 scientific sessions, 3500 poster presentations, 200 exhibits, career and job placement programs and much more. The conference will bring together 6,500 biophysicists from around the world from every end of the industry.

Abstract submission is open until October 8th. Visit the [website](#) to read more.

www.biophysics.org/2011meeting

Condensed Matter and Materials Physics: CMMP10

This December IOP Conferences presents Condensed Matter and Materials Physics 2010 (CMMP10) at the University of Warwick from the 14-16 of December, 2010. The conference, with a wide range of symposia, will reflect the breadth of condensed matter and materials physics and offers a forum for student presentations. The abstract submission dead line is October 8th and the early registration deadline is November 18th.

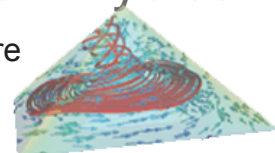
To read more visit the IOP conferences [website](#).

www.cmmp.org.uk/

IOP Institute of Physics

The topics include but are not limited to:

- Biological and computational physics
- Materials and characterization
- Nonlinear and complex physics
- Polymer physics
- Thin films and surfaces.



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