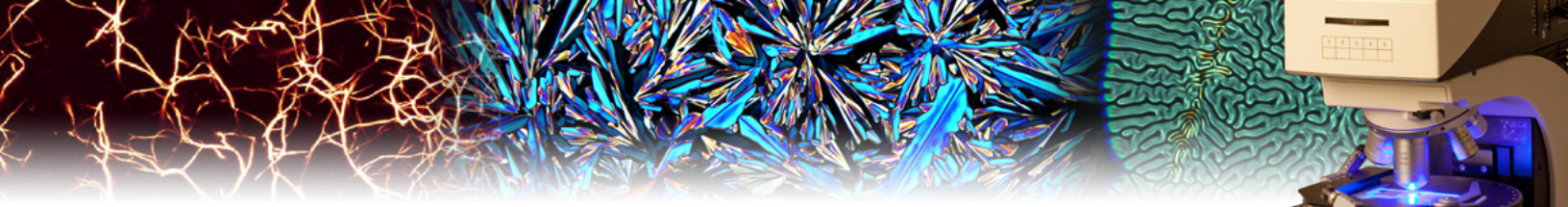


Soft Matter World Newsletter

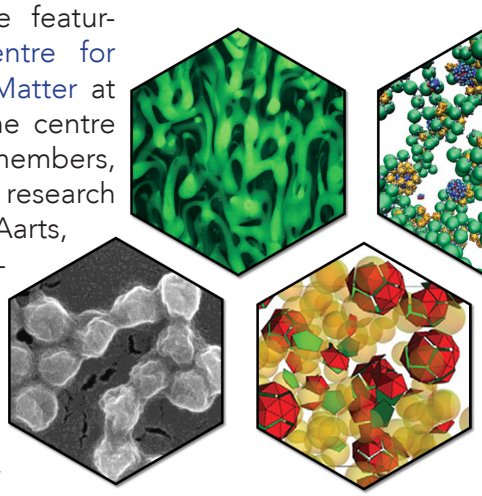
May | 2011 | Issue 29

Dear Soft Matter Colleagues,

Summer begins with plenty of new conferences and great features. This summer season we want to encourage our readers to print out the newsletter and post it in your workplace. Pass the word on to fellow researchers and students!

Oxford Centre for Soft and Biological Matter

This month we are featuring the Oxford Centre for Soft and Biological Matter at Oxford University. The centre is composed of 6 members, each with their own research group. The members are; Dirk Aarts, Jonathan Doye, Roel Dullens, Ramin Golestanian, Ard Louis and Julia Yeomans. Within the centre the groups collaborate closely, sharing students and postdocs across departmental boundaries. The centre's research is highly interdisciplinary spanning the border between theoretical physics, chemistry, applied mathematics and biology. In their words, "Biology is soft matter come alive.*" The research projects of the centre include;



"Biology is soft matter come alive."

Microscopic Swimmers: The Yeomans and Golestanian Group employ the basic principles that govern the physics and chemistry of microscopic systems in liquid environments to design autonomous swimmers.

Self Assembly: The Doye group in collaboration with the Louis group investigate the biological self-assembly of complex objects. More specifically they have an ongoing research program which aims to address the physical properties underlying reversible self assembly of viral capsids and subsequent creation of synthetic particles that could similarly self-assemble.

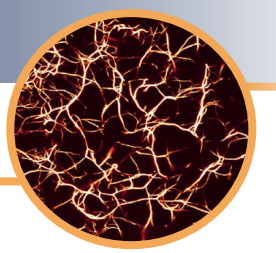
Liquid Crystals: The Yeoman Group focuses a lot of their research on the hydrodynamics of liquid crystals. Research over the past few years has included: The effect of flow on the motion of topological defects / Blue phase stability and hydrodynamics / Permeative flow in cholesterics / Flow in liquid crystal devices.

Colloids: The Dullens and Aarts Groups conduct a variety of research on colloidal systems. Some of their current research projects include flow of complex fluids in microfluidic channels and jamming and crystallisation in frustrated systems.

Droplet Dynamics: The Yeomans group conducts research on superhydrophobic surfaces. The group hopes to improve micro channel design with the use of analytic and numerical approaches to further understand the phase transitions and dynamics of drops on patterned surfaces.

Evolution: The Louis and Doye research groups use theoretical tools and computer simulations to study a number of simplified models they have been developing to understand the physics of evolution. For example, they have been investigating how evolution can explain the structures of protein complexes, and also studying some simple models of self-assembling tiling systems.

DNA Nanostructures: DNA is used as a model to develop and understand walking DNA devices and developing efficient algorithms to simulate the models.



Protein Crystallization: Research aimed at understanding why protein crystallization is so difficult and in developing methods that can make crystallization easier.

There are currently Post-doc and PhD openings in the Yeomans, Aarts, Dullens, Louis and Doye groups. The research areas involve some of the above mentioned topics. Visit the website to read more.

Snapshots of fibrillation and aggregation kinetics in amyloid fibrils

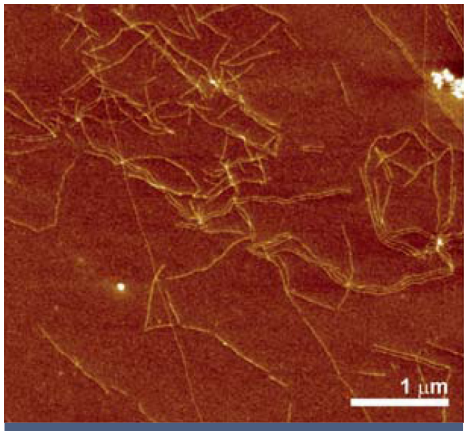
Sreenath Bolisetty, Jozef Adamcik and Raffaele Mezzenga. Soft Matter, 2011, 7, 493–499. DOI: 10.1039/c0sm00502a

Protein unfolding results in structural rearrangements of the polypeptide backbone with possible self-assembly of certain proteins into insoluble protein aggregates also known as amyloids. Amyloid formation has drawn a lot of attention in recent years as several human diseases are associated with their formation. Most notably Alzheimer's, Huntington's, Creutzfeldt–Jakob, Parkinson's and even type 2 diabetes.

In this paper researchers present an investigation on the structural time-evolution of multistranded β-lactoglobulin protein fibrils by combining small angle neutron scattering (SANS), dynamic (DLS) and depolarized light scattering (DDLS) as well as atomic force microscopy (AFM). Light scattering techniques, combined with SANS clearly demonstrate the different stages of conversion of β-lactoglobulin monomers into semiflexible protein fibrils. In addition, AFM allows the resolution of some details of the fibrils at the molecular length scale.

The individual stages of the fibrillation and aggregation process are discussed in detail, in terms of the colloidal physics involved.

Raffaele Mezzenga was just recently awarded the John Dillon Medal at the APS March meeting for exceptional contributions to the understanding of self-assembly principles and their use to design and control materials with targeted functionalities.

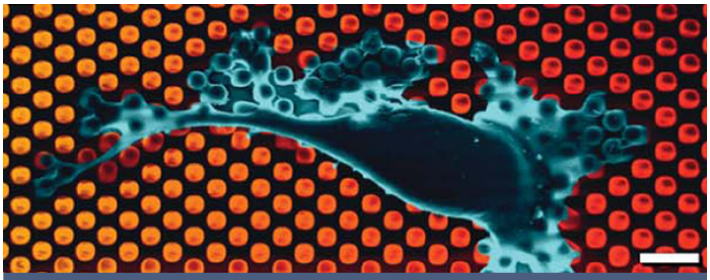


▲ Atomic Force Microscopy (AFM) height images of heated β-lactoglobulin at pH 2 and 90 C.

To read more visit RSC publishing or the Mezzenga group website.

Mechanical cellular stimuli via micropost array gradients

Ryan D. Sochol, Adrienne T. Higa, Randall R. R. Janairo, Song Li and Liwei Lin. Soft Matter, 2011, Advance Article. DOI: 10.1039/C1SM05163F, Communication.



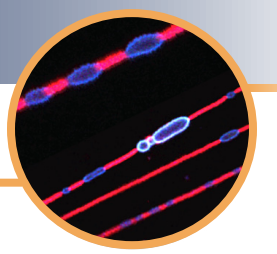
▲ False-colored Scanning Electron Microscopy (SEM) image of a bovine aortic endothelial cell (BAEC) (blue) seeded on a micropost array. The stiffness gradient on the microposts increases in stiffness (yellow to red). Scale bar ¼ 10 mm.

Researchers introduce a methodology of constructing micropost array gradients to investigate the effects of unidirectional substrate stiffness cues on living cells. Recent work has revealed significant roles of mechanical cues for living cells.

In this work, microposts of varying radii, and thus varying stiffnesses, were employed to apply unidirectional mechanical cues to living cells. Experimental results revealed preferential cell migration in the direction of increasing micropost stiffness.

As a method for investigating the cellular response to substrate stiffness cues, micropost array gradients offer a simple, yet powerful technique for applying unidirectional mechanical stimuli to living cells.

Visit RSC Publishing to read more.



10th International Conference on Materials Chemistry (MC10)

The 10th International Conference on Materials Chemistry is being held from July 4th through July 7th in Manchester, UK. The 'MC' conference series has provided a showcase for materials chemistry for almost two decades, and is the flagship event of the RSC's Materials Chemistry Division. Recent editions of the MC series have been very successful: MC7, held in Edinburgh in 2005, attracted over 450 delegates; and MC8 saw 500 scientists present their work and network in central London.

The five main themes will be distributed across four parallel sessions. There will be plenary lectures at the beginning and end of the conference, and at the beginning and end of each of the two middle days. Each symposium will have a keynote speaker followed by contributed speakers.

The themes are;

- Energy and sustainability
- Advanced technologies & nanomaterials
- Life and health
- Soft matter: polymers; polymer-inorganic hybrids; colloids; liquid crystals; supramolecular systems.
- Crystalline solids

The call for poster abstracts is the May 6th, 2011. To read more visit the MC10 website at Royal Society of Chemistry (RSC) website.

13th International Conference on Ferroelectric Liquid Crystals

The 13th International Conference on Ferroelectric Liquid Crystals is being held from the 29th of August through the 2nd of September 2011 at the Niagra Falls Convention Center, Canada. Since the first ICFLC in Arcachon in 1987, the conference provides a unique forum for scientific exchanges in the area of chiral and polar soft matter. Topics range from the design, synthesis, physical characterization and modeling of new materials to their applications in new technologies. Pre-conference tutorials are also planned, and attendees will have opportunities to discover the wonderful Niagara Peninsula region and the world famous Niagara Falls. The primary conference topics include;

- Design and synthesis
- Structure-property relationships
- Physical properties
- Phase transitions
- Theory and modeling
- Surface interactions and alignments
- Display Applications

The conference is organized under the auspices of the Liquid Crystal Institute at Kent State University. Early registration begins May 1st, 2011. To read more visit the website.

We hope you enjoy browsing softmatterworld.org and come back soon

Linda S. Hirst and Adam Ossowski

SoftMatterWorld.org