Dear Soft Matter Colleagues,

Welcome to our May newsletter. This month, we are featuring a cornerstone institution in soft matter science—the Freiburg Institute for Advanced Studies, a study of collective motion in bacteria, and upcoming exciting conferences.

FRIAS School of Soft Matter Research

The Freiburg Institute for Advanced Studies (FRIAS) School of Soft Matter has been a cornerstone of soft matter research since it was founded in August, 2008. The institute takes advantage of a huge interdisciplinary network of scientists to create novel organic materials with biological characteristics. Liquid crystals, large molecules, polymers, and other biomaterials are engineered to their environment in a highly selective way.

Many projects, such as the development of microfluidic medical micro-sensors, soft-matter-based nanosystems for drug delivery, production of nano electromechanical systems using DNA origami, bionic chemistry, and the development of micro MR imaging techniques for flat tissues, border on life sciences. Other research foci, such as mechanisms and materials of photosensitive molecular processes, aim to develop more efficient solar cells. The institute is directed by professors Hermann Grabert and Jan G. Korvink. Dr. Grabert is a theoretical physicist who studies transport in quantum nanostructures. Dr. Korvink is a professor for microsystems engineering and runs the Laboratory for Microsystem Simulation in the Albert Ludwig University in Freiburg.

Since 2008, 31 fellows (8 Internal Senior Fellows, 9 Junior Fellows, 13 External Senior Fellows and 1 Honorary Fellow) have worked at the School of Soft Matter Research. Currently, 23 PhD students and postdocs are working on soft matter projects. The scope and velocity of research coming from the group is highlighted by the 360 peer reviewed papers published since 2008, including numerous articles in Science, Nature Nanotechnology, Nature Chemistry, Angewandte Chemie Int., PNAS and PRL.

Currently, FRIAS has two post-doctoral positions available. One for a specialist in high throughput nuclear magnetic resonance for small organism in vivo metabolite analysis with Dr. Korvink and the other for a computational biophysicist with expertise in simulation of protein folding and aggregation kinetics, lipid-protein complexes and antibody interactions with Dr. Küst.

Read more about the institute and its constituent researchers on their website.

Black Forest Focus on Soft Matter 8

This workshop will be held from October 10-14 in Hotel Vier Jahreszeiten, Schluchsee, Black Forest, Germany and will focus on the design and processing of semiconducting soft materials, mechanisms of electronic and excitonic transport in soft matter systems, and the interplay between structure and properties with a particular eye on new directions for the improvement of soft matter based devices.

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The presentations and discussions will cover:

- Molecular design, synthesis, and self-assembly of soft functional materials (molecular and supramolecular structures, nanocrystals, polymers, carbon nanostructures, biomaterials, hybrids).
- Mechanisms of electronic and excitonic transport (diffusion, quantum coherence, mobility, charge separation) and their relationship with molecular structure and supramolecular organization.

- Fabrication and processing of soft materials into functional devices (FETs, solar cells, OLEDs).

The program consists of seminars and a poster session including fourteen keynote speakers and six seminar speakers.

Online registration for this event is open, register on the website.

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**Scale-Invariant Correlations in Dynamic Bacterial Clusters**


These screenshots from a video in the supplemental material demonstrate how bacteria form and travel in clusters. Click here to watch the video.

Collective motion is an exciting topic in soft matter science. From bird flocks and fish schools that travel in a three dimensions, to bacterial clusters that travel on a flat plane, the principles of collective motion appear to be similar. In this paper, the authors investigated the collective motion of bacteria, B. Subtillus, revealing long range, scale-invariant correlations. Researchers from Shanghai Jiao Tong University, Ben-Gurion University of the Negev in Israel and the University of Texas at Austin determine the position, orientation, and velocity of bacteria in a growing bacterial culture edge by recording videos of the expanding culture. Clusters of bacteria are defined by common direction of motion and spatial proximity. Correlation lengths of velocity and speed fluctuations within a cluster were found to increase linearly with the spatial size. For a range of cell density and cluster size, the correlation length is shown to be 30% of the spatial size of clusters.

These findings along with previous research on bird flocks suggest that long-range scale-invariant correlations may be a general feature in systems exhibiting collective motion.

To read more visit PRL.

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**IOP Presents: Physics meets Biology**

Physics meets Biology 2012 will provide a broad view of the most recent and exciting research across a broad range of topics and scales: its scope includes physical probes and imaging, bionanotechnology, molecular machinery, cytoskeletal mechanics, signaling, control, neural systems, development, evolution and ecology. There will be a special session devoted to teaching Biological Physics. The conference is organized around an international program of invited speakers from a wide range of disciplines and will include contributed talks and poster sessions. Its state-of-the-art research coverage is designed to inform experts of the latest developments; it will also provide a valuable introduction to biophysical research for junior researchers, including graduate students. This conference is wide ranging, participation of scientists from all backgrounds is encouraged.

This conference will be held from September 3-5th at the University of Oxford, United Kingdom. Abstract submission deadline is June 6th, early registration deadline is July 27th, and registration final deadline is August 24th.

Read more, register, or submit an abstract on the website.
I-CAMP 2012 Summer School on Renewable and Sustainable Energy at Boulder

The Inter-Continental Advanced Materials for Photonics (I-CAMP) Summer School will be held from July 16- to August 11th (tentative) at the University of Colorado, Boulder. The school will enable researchers working at the forefront of materials science & photonics to discuss the emerging uses of light for control, the fundamental study of matter and advances in the use of materials to control light. Participation of students, postdoctoral fellows, and other early-career professionals is strongly encouraged.

Up to 20 fellowships will be awarded to support travel of early-career scientists each year. May 2 is the last day to apply for a fellowship. June 15th is the last day to apply for the school without requesting support. Cost is 150 for students and 300 for professionals.

At each I-CAMP Summer School, there will be 50-100 students from a diverse, international range of scientific backgrounds. Each participant will be invited to present a poster on his/her current research project.

Read more and register on the website.

Sensitive Matter by Michel Mitov: Foams, Gels, Liquid Crystals, and Other Miracles

This text, appropriately named “Foams, Gels, and Other Miracles” gives a broad, fourteen chapter overview of how soft matter science can be seen in everyday life, relating schools of fish, rubber, and even the blood of Saint Januarius to the subject. This approach enables the author to talk in depth on a broad range of subjects. Michael Mitov is Director of Research at CNRS (The National Center for Scientific Research, France) and Head of the Liquid Crystal Group at CEMES (Le Centre d’Elaboration de Matériaux et d’Etudes Structurales) in Toulouse. The book was translated from French into English by Giselle Weiss and is available from Harvard University Press.

We hope you enjoy browsing softmatterworld.org and come back soon
Linda S. Hirst, Adam Ossowski and Dmitri Medvedko

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