

Soft Matter World Newsletter

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Kuhl Research Group at UC Davis



This month we are pleased to feature a fellow University of California research group from UC Davis; the Kuhl Research Laboratory on Surface and Interfacial Science led by Prof. Tonya Kuhl. In the spirit of fellow University of California campuses the group uses modern and innovative approaches to investigate classic soft condensed matter topics.

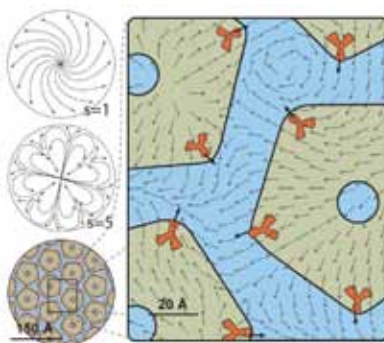
The quote, "*Interfaces are where things happen*" is the first thing you see upon entering their website and the group's research interests certainly demonstrate this. Their research is focused on measuring intermolecular and intersurface forces in complex fluid systems with an emphasis on polymers, polyelectrolytes, bio-membranes, and bio-mimetic materials. According to Kuhl, these materials are significant because they can be prepared from renewable resources, are biocompatible and biodegradable, and often possess excellent physical properties.

The group employs a highly inter-disciplinary approach to their research utilizing modern principles and technology.

The current research projects include;

- **Neutron / X-ray Scattering in Thin Layers at Interfaces:** The group uses two techniques, X-ray/neutron reflectivity and X-ray grazing incidence diffraction (GID), to study features smaller than the wavelength of light. Parameters such as layer thickness, density, and interfacial roughness can be determined by characterizing the surface's reflectivity.

- **Nanoassembly and Smart Films:** By combining



"Interfaces are where things happen."

polymer self-assembly and semiconductor photolithography techniques, the group is developing novel platform technologies for high throughput screening of biomolecules and other MEMS applications.

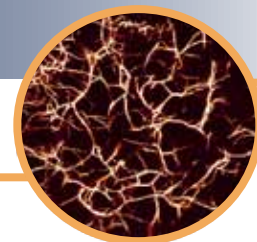
- **Ligand-Receptor Interactions and Cellular Adhesion:** The group creates model membranes to directly measure the adhesion between membranes. They then use this fundamental physical understanding in simulations to obtain predictive abilities for rationally engineering biomimetic surfaces and liposomal-based, targeted drug delivery systems.

- **Lipid Phase Behavior:** A combination of techniques are employed in their research to decode some of the fundamental questions in lipid phase behavior; what the mechanism is behind lipids partitioning into ordered/disordered microdomains and the effects of lipid composition on embedded proteins or extracellular agents.

- **Membrane Fusion:** An investigation into thermodynamic pathways in membrane fusion, a process that plays a key role in many biological processes (i.e. exocytosis, endocytosis, synaptic transmission, fertilization, and viral infection).

There is an open postdoctoral position along with opportunities for graduate and undergraduate students.

The informative website has an interactive layout full of information on their research. To read more visit the [website](#).



RSC Blog: 10 most cited papers in the history of Soft Matter Journal

Katherine Thomas, Web Writer

Soft Matter blog writer, Katherine Thomas, has compiled the top ten most cited Soft Matter Journal articles since 1995 when the journal was founded. The numbers were determined by ISI Web of Knowledge.

The subject matter varies widely, from why materials wrinkle and buckle, to the self-assembly of Janus particles, and a new experimental technique to measure the yield stress of fluids. However, one topic stands out; superhydrophobicity. The top two spots are occupied by research reviews on the mechanics and properties of water repellancy and research progress on the development of superhydrophobic materials.

If you find this interesting you can also read last month's blog entry on the top 10 cited Soft Matter articles of 2011.

To read more visit the [blog at RSC Publishing](#).

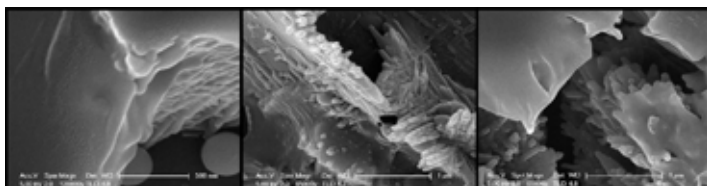
Soft Matter

the top 10 most cited articles



Nanostructured Aniline Oxidation Products: Self-Assembled Films at the Air/Liquid Interface

Zoran D. Zujovic, and James B. Metson. *Langmuir* 2011, 27, 7776-7782. [dx.doi.org/10.1021/la102684d](https://doi.org/10.1021/la102684d)



▲ The SEM micrographs of a film and a precipitate obtained after the oxidative polymerization of aniline in the aqueous solution of ammonium persulfate and hydrochloric acid

Polyaniline (PANI) is one of the most widely studied conducting polymers. Because of its ease of preparation and attractive chemical and material properties PANI-based materials and composites display promise for application in many areas.

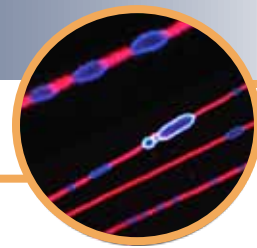
The authors report on a "falling pH" approach to obtain the free floating films at the air/liquid interface during aniline oxidative polymerization in the presence of hydrochloric acid. The films are compact and consist

of small densely packed particles (around 10-20 nm in diameter). The thickness of the films depends on the concentration of the reactants and ranges from 40 to 50 nm.

Scanning electron microscopy (SEM) and transmission electron microscopy results imply that 3D nanostructures are physically adsorbed onto the film and that they represent two separated phases. Fourier transform infrared (FTIR) and UV-vis measurements have confirmed the presence of polyaniline and branched oligoanilines.

A mechanism for film growth has been proposed on the basis of spatially oriented distribution of H₂O and aniline at the air/liquid interface. Three samples are synthesized in the presence of different acids-nitric, sulfuric, and acetic. The SEM and FTIR data showed similar morphologies and structural characteristics and implies structure of the final products depend on the acidity conditions (pH) during the reaction rather than on the nature of the dopant acid.

To read more visit the website at [RSC Publishing](#).

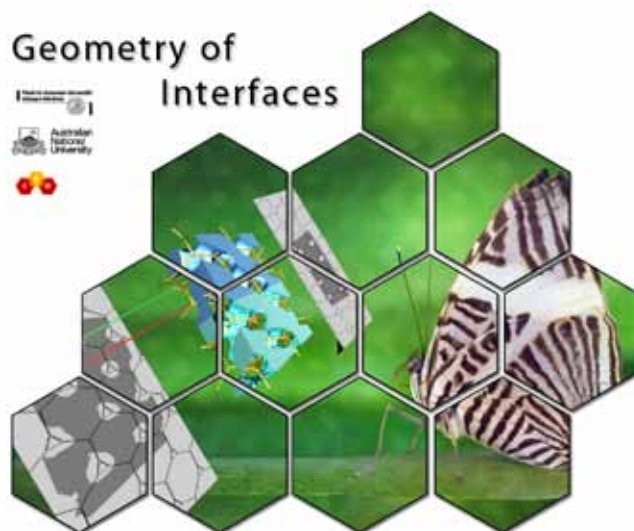


Geometry of Interfaces 2011

Geometry of Interfaces is an interdisciplinary exploration of physical and biological genesis and function of topologically complex patterns in-vivo, in-silico and in-vitro. The conference will be held the 3rd through the 7th of October 2011 in Primosten, Croatia. The organizers invite contributions from biology, physics, chemistry, materials science and mathematics.

The topics will be focusing on topological complexity in materials & biology:

- Gyroid-Phases in Condensed Matter
- Ordered Membrane Organelles
- Triply-periodic Minimal Surfaces
- Emergence of Chirality
- Topology & Intra-cellular Organisation
- Biological Photonic Crystals
- Cubic Bicontinuous Phases
- Structural Entanglement & Networks
- Effective Properties and Confinement
- Polycontinuous Patterns In-vivo & In-vitro



Organised by Gerd Schroeder-Turk (Erlangen, Germany) and Stephen Hyde (Canberra, Australia).

To Read more visit the [website](#).

25th ECIS Conference

European Colloid and Interface Society



The 25th European Colloid and Interface Society meeting, which will be held in Berlin, Germany, September 4-9, is organised by the Max Planck Institute of Colloids and Interfaces in Potsdam/Golm in close cooperation with the TU Berlin. The meeting is a joined event of ECIS and the German Colloid Society.

It will follow the tradition of the series of ECIS conferences and biannual meetings in the past, to provide a podium for scientists from fundamental and applied science and particularly promote the work of young

scientists in this important scientific field.

The main scientific topics are as follows;

- Dynamics of Interfaces
- Films, Foams, Emulsions
- Wetting, Spreading
- Particles, Nanoparticles, Capsules, Dispersions
- Structure and Rheology of Colloidal Systems
- Bioinspired Materials (priority for Kolloidgesellschaft)
- Surfactants and Sustainability (priority for Kolloidgesellschaft)
- Surface Forces
- Specific Ion Effects

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

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