

GRANADA, SPAIN
JULY 5 – 8, 2010

The International Soft Matter Conference 2010 was held in Granada, Spain at the Granada Exhibition Conference Centre on July 5-8, 2010. The Biocolloid and Fluid Physics Group led by Prof. R. Hidalgo-Álvarez planned and organized an international conference focussing on multi-component composites and mixtures, wide length and time scales, hierarchical metastable structures and many interacting degrees of freedom, leading to complex structures, phase behaviour and dynamics.

The conference brought together students and scientists interested in Soft Matter systems such as polymers, colloids, surfactants, membranes, biomaterials and their composites. Soft Matter implies high sensitivity to external fields and ubiquitous and significant non-equilibrium phenomena, and requires an interdisciplinary approach connecting theoretical, computational and experimental physics, physical chemistry, material science and biology. A special focus of discussion in this context was the application of Soft Matter concepts to biological and biomimetic systems. In this field, basic science and a broad range of modern technological application encompassing also many aspects of nanoscience are closely related. These links were emphasized during the conference, thereby fostering the exchange between academia and industry. The conference was therefore organized along themes associated with Biophysics, Colloids, Polymers, Surfaces and Interfaces, Membranes, Dynamics of Complex Fluids, Soft Nanotechnology and Self-assembly. There were four types of presentations: plenary talks, invited and contributed talks, and posters. These were chosen by the Program Committee in coopera-

tion with the Advisory Board. In numbers, the conference registered a total of 570 participants presenting up to 8 plenary lectures, 38 invited talks, 88 oral communications and 561 poster communications.

In the area of Colloids, L.M. Liz-Marzán was the plenary speaker. The talk surrounded issues on multifunctional microgel colloids. Invited talks on this subject dealt with “The phasechip: manipulating phase diagrams with microfluidics” (S. Fraden), “Colloidal monolayers on quasiperiodic light fields” (C. Bechinger), “Colloids as models for liquids, crystals, and random close packing” (E.R. Weeks, J. Hernández-Guzmán & R. Kurita), “Directing colloidal self-assembly by templates, electric fields, and depletion attractions” (F. Smalenburg, M. Hermes, R. Ni, A. Patti & M. Dijkstra) and “The puzzle of sudden gel collapse – what is going on?” (P. Barlett, L. Teece, I. Zhang, P. Royall & M. Faers).

In the area of Dynamics of Complex Fluids, P. Schurtenberger opened the first session with a keynote lecture on colloidal glasses and gels. Invited lectures on this topic were as follows: “The effects of boundaries and interfaces on shear banding in complex fluids” (P.D. Olmsted, J.M. Adams, S.M. Fielding & S. Skorski), “Coarse grain simulations of rheological properties of polymer liquids; from blobs to single particle models” (W.J. Briels), “Micromechanics of soft colloidal glasses” (M. Cloitre & R. Bonnecaze), “Multilamellar structures induced by antagonistic salt added to a binary mixture of water and organic solvent” (K. Sadakane & H. Seto) and “Microrheology of phospholipid monolayers: direct visualization of stretching, flowing, yielding and healing” (T.M. Squires, S.Q. Choi & J.A. Zasadzinski).

Figure 1 (left):
Granada Exhibition Conference Centre – venue of the ISMC 2010.

Figure 2 (middle):
Granada Exhibition Conference Centre – venue of the ISMC 2010.

Figure 3 (right):
Group photo of the ISMC 2010.



Plenary speaker on Membranes was S.A. Safran who talked about line activity of hybrid lipids. Invited talks on this subject were: “Mechanics of cellular aggregates” (C. Clanet, D. Cuvelier, S. Dufour, D. González-Rodríguez, K. Guevorkian & F. Brochard-Wyart), “Biomembranes: membrane proteins and active cytoskeleton” (T. Auth) and “Soft matter nanosystems for gene and drug delivery” (J.O. Radler).

In the area of Self-assembly, M. Olvera de la Cruz gave the keynotes focussing on ionic membranes and gels. Invited talks on this subject were: “Block copolymers at surfaces: patterns, templates and applications” (D. Andelman, X. Man & H. Orland), “Amyloid peptides and peptide copolymers: from self-assembly towards therapeutics” (I.W. Hamley), “Morphology driven failure mode transition in self-assembled transient networks” (C. Ligoure, T. Tixier, A. Lappereousaz & L. Ramos), “Interactions of DNA with cationic surfactants and proteins: gels and nanoparticles” (M. Miguel, C. Morán, D. Costa, D. Lundberg & B. Lindman) and “Laponite as a complex colloid: aggregation, gel and glass formation” (E. Zaccarelli, B. Ruzicka, L. Zulian, R. Angelini, G. Ruocco, M. Sztucki, A. Mousaid & F. Sciortino).

A plenary talk on Surfaces and Interfaces was provided by D. Langevin on foams stabilized by particles. Invited talks on this subject were: “Particle-stabilized oscillating dimer” (J.W. Tavaoli, J.H.J. Thijssen & P.S. Clegg), “Bio-films by neutron scattering: a perspective” (G. Fragneto), “Grafted polymer layers: a way to control adhesion and friction” (L. Leger), “The critical Casimir effect: measuring and tuning femto-Newton forces” (S. Dietrich) and “The effect of ion size on colloidal forces: a Monte Carlo simulation study” (J.G. Ibarra-Armenta, A. Martín-Molina, R. Hidalgo-Álvarez, E. González-Tovar & M. Quesada-Pérez).

In the area of Soft Nanotechnology, K. Landfester was the plenary speaker. The invited talks on this subject were: “Electrochemical nanofluidics: mesoscopic and single-molecule limits” (M.A.G. Zevenbergen, P.S. Singh, E.D. Goluch & S.G. Lemay), “Soft organic thin films, based on nanostructured polymeric composites, as ultra sensitive piezoresistive materials and their applications” (E. Laukhina, R. Pfattner, L.R. Ferreras, S. Galli, M. Mas-Torrent, N. Masciocchi, V. Laukhin, C. Rovira & J. Veciana), “Collective behaviour and self-organization in fluid micro-systems” (S. Thutupalli, R. Seemann & S. Herminghaus),

“Microorganism growth kinetic variability in droplet” (J. Bibette), and “Nanoparticle amphiphiles” (S.K. Kumar).

Finally, in the area of Polymers a plenary lecture entitled “Entanglement dynamics in homopolymer liquids” was delivered by H. Watanabe. Invited talks on this subject included: “Telechelic linear and star polymer melts: linear rheology and modelling” (E. van Ruymbeke, N. Hadjichristidis, M. Pitsikalis & D. Vlassopoulos), “Is dynamics important for protein function?” (R. Biehl, R. Inoue, T. Rosenkrantz, J. Fitter & D. Richter), “Polymer physics of airway surface layer in lungs” (L. Cai, B. Button, R. Boucher & M. Rubinsten), “Force distribution through complex molecules: clues to biomechanics and function” (F. Graeter), and “Computer simulations of block copolymer dynamics: soft confinement in nanostructured mesophases” (A. Moreno, Z. Slimani & J. Colmenero).

Rheological aspects were present in all of the topics involved. However, of outstanding interest were the communications presented under the topic entitled Dynamics of Complex Fluids (the second topic in number of communications). Most of the rheological investigations dealt with gels, soft pastes and glass-forming liquids. The interplay between boundary conditions and flow geometries in shear banding was analysed by P.D. Olmsted. W.J. Briels presented coarse grain simulations of polymer liquids and the RaPiD model to simulate the rheological properties of telechelic block-copolymer solutions and of linear polymer melts. The rheology of soft colloidal glasses was reviewed by M. Cloitre. He showed that many static and dynamical properties of soft glasses results from a subtle interplay between their disordered glass-like structure and the existence of specific solvent-mediated interactions. F. Scheffold used a simplified microstructural picture to describe the interactions between thermosensitive microgel particles. The elastic modulus in quenched solid phases derived from the potential was found to be in agreement with DWS and mechanical rheometry. Large scale molecular dynamic simulations by A. Jabbarzadeh showed a clear correlation between the flow-induced-crystallization critical strain, the rheology and molecular structure. A new technique was presented by T.M. Squires to measure interfacial rheology of fluid-fluid interfaces, and the non-linear rheology of cytoskeletal networks and extracellular matrixes was investigated by P.A. Janmey.

Conference Report I

Other rheological studies involved improved effective-medium theories to obtain the concentration dependence of the viscosity of emulsions and particle suspensions; investigations on the viscosity transition from non-Newtonian to Newtonian in dilute solutions of rigid rods; the gelation of egg yolk/ κ -Carrageenan blends; the study of the flow behaviour of colloids in viscoelastic solvents using multiparticle collision dynamics simulations; magneto- and electrorheology; thin-film rheology; Rheo-SAXS; rheology of fluidized beds; LAOS and Interfacial Rheology.

The ISMC 2010 conference benefited from technical and financial support from the Spanish Ministry of Innovation and Science, the Andalusia Government, the University of Granada, the Donostia International Physics Center, the Forschungszentrum Jülich, the Science Park and the SoftComp European Excellence Network.

*Juan de Vicente and Roque Hidalgo-Álvarez**
Applied Physics Department
University of Granada
Granada, Spain
** rhidalgo@ugr.es*