

Iberian Rheology Conference 2015 (IBERO'15)

COIMBRA, PORTUGAL
SEPTEMBER 7–9, 2015

IBERO'15, the Iberian Rheology Conference 2015, was the 5th in the series of conferences organized jointly by the Portuguese Society of Rheology (SPR) and the Spanish Group of Rheology (GER), which started in 2004 in Beja, Portugal. IBERO presently takes place every two years, either in Portugal or in Spain, and this time took place in Coimbra, Portugal, hosted by the University of Coimbra, well known by its history of over 700 years, in its engineering campus. The conference was chaired by Graça Rasteiro from Coimbra University and co-chaired by Teresa Cidade, president of SPR. This year's conference was subjected to the topic "Challenges in Rheology and Product Development", having addressed the most recent trends in rheology, including: Experimental Methods, Modelling and Simulation in Rheology, Multiphase Systems and Composites, Product Formulation, Interface Rheology, Microrheology and Micro Fluidics and Applications, with special emphasis on food, polymers and biopolymers and cosmetics.

The Conference, which took place from the 7th to the 9th of September, joined together around 100 participants from eleven different countries, and was an opportunity to bring together experts in the field of rheology to discuss and learn about different and important topics in this field, exchanging experiences and creating the opportunity for networking and establishment of future collaborations. In total, 198 authors presented 90 communications during the conference. A

single set of speaking sections, including 40 % of the presentations, constituted the core of the conference, to allow better interaction between participants. The remaining communications were presented during the two poster sections with a special period dedicated exclusively to the discussion of those works. It is also worth stressing the participation of young researchers, especially PhD students, whom constituted around 30 % of the total number of participants.

The Conference full papers were gathered in the IBERO'15 Conference Proceedings with ISBN: 978-989-26-1056-6. A selection of papers will be published, till the end of 2015, in the on-line journal e-Rheo.Iba (Ibero_American Journal of Rheology). State of the art rheological techniques and related equipment was available during the three days of the conference in the exhibition which took place simultaneously with the conference. In addition, participants had also the opportunity to visit the beautiful and historical city of Coimbra, second capital of Portugal from 1139 to 1250, including the Old University, today recognized as UNESCO Patrimony, as well as the surroundings of Coimbra namely the Bussaco National Forest.

In addition to the submitted presentations, the conference included the participation of three invited keynote speakers, reputed experts in the field of rheology, who launched the discussion in three of the main topics of the conference. Philippe Coussot from Univer-



Figure 1: Welcome reception at the Portuguese Engineers Association on September 7, 2015.

This is an extract of the complete reprint-pdf, available at the Applied Rheology website
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sité Paris-Est in France and researcher at Laboratoire Navier from the same university, highlighted the importance of rheology in multiphase systems. Manfred Wagner from the Berlin Institute of Technology in Germany and previous President of the German Society of Rheology and of the European Society of Rheology, addressed the importance of modelling in rheology. Evelyne van Ruymbeke from Université Catholique de Louvain – UCL, in Belgium, dealt with the importance of rheology for product design. We describe briefly, below, the contributions of the three keynote speakers to the conference program.

Philippe Coussot was the first keynote speaker with the communication “Rheophysics of concentrated dispersed systems: From foams to waxy crude oils”. Coussot highlighted that a wide range of materials (paints, cement pastes, emulsions, colloids, etc.) have very different types of structures at a local scale, but the unity of these systems mainly relies on their (macroscopic) mechanical properties. Their basic common rheological property is their yield stress. The flow rate of the fluid progressively increases beyond the yield stress. Smooth transition from the solid to the liquid regime is typical of systems in which mainly repulsive interactions take place. In contrast, concentrated systems with mainly attractive interactions tend to develop shear banding. Rheometric measurements with MRI allowed observation of solid-liquid transition inside the material. The smooth solid-liquid transition for repulsive systems can be associated with a short relaxation time for the restructuring process, while the abrupt transition is associated with a long relaxation time.

Manfred Wagner gave his keynote lecture entitled “A consistent model for elongational flow of polymer melts and solutions based on the interchain pressure effect” on the second day of the conference. Wagner explained that the extended interchain tube pressure model for polymer melts and concentrated solutions is based on the idea that the pressures exerted by a polymer chain on the walls of an anisotropic confinement are anisotropic. In a tube model with variable tube diameter, chain stretch and tube diameter reduction are related, and at deformation rates larger than the inverse Rouse time, the chain is stretched and its confining tube becomes increasingly anisotropic. In the extended interchain tube pressure (EIP) model, it is assumed that chain stretch is balanced by interchain tube pressure in the lateral direction, and by a spring force in the longitudinal direction of the tube, which is linear in stretch. Predictions of the EIP model were compared to the steady-state elongational viscosity data of PS/DEP solutions. Except for a possible influence of solvent quality, linear and nonlinear viscoelasticity of entangled polystyrene solutions can thus be obtained

from the linear-viscoelastic characteristics of a reference polymer melt and the shift of the glass transition temperature between melt and solution.

Evelyne van Ruymbeke was the third keynote speaker at IBEREO’15 and her lecture entitled “Rheology of complex macromolecules: Relating their composition to their viscoelastic properties” took place on the third day of the conference. The lecture focussed on the understanding and prediction of the viscoelastic response of polymer melts or concentrated solutions, from the knowledge of molecular architecture, with the objective of developing a general coarse-grained model for predicting the viscoelastic properties of linear and branched polymers. Based on the tube theory, as well as on the ability to synthesize well-defined polymers of complex architectures, the lecture addressed more and more complex chain architectures towards randomly branched polymers proposing important modifications to the models presented in literature, in order to work with “branch on branch” molecular architectures. The model proposed was shown to be able to be extended to a variety of applications. The inverse problem of predicting molecular weight distribution from the relaxation moduli, based on a parametric approach, which allows facing the ill-posedness of this problem, was discussed. The future objective is to extend the model to account for the rheology of macromolecular self-assemblies exhibiting reversible structural changes during deformation and thermo rheological complexity.

Attendance to the sessions was very high allowing stimulating discussions during presentations. In the first day of the conference a very friendly get together offered by the Portuguese Engineers Association, which took place in the delightful garden of the Association building in Coimbra, allowed establishing additional contacts between participants and set the spirit of the conference. At the end of the conference, in the closing ceremony, the award to the Best Iberian PhD Thesis on the topic of rheology, sponsored by both SPR and GER, was presented, as well as the three Best Posters awards, sponsored by EPL (Europhysics Letters) from IOP Science.

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