

The **BSR Non-Newtonian club** held a very successful meeting on the 6th June 2006 at the **University of Nottingham**, hosted by Dr. Karen Steel in the School of Chemical, Environmental, and Mining Engineering (SChEME) and sponsored by **Unilever Corporate Research**. The day featured quality presentations on a range of topics from both inexperienced and experienced academic and industrial rheologists in a relatively informal environment. Despite the range of topics presented, there was plenty of questions and discussion.

The day began with coffee and danishes, and then a series of presentations from the more experienced scientists. First off was **Professor John Mitchell** (*Food Sciences, Univ Nottingham*) who spoke on the influence of rheology on mouthfeel and taste perception. A key point arising from the talk was that the efficiency with which food mixes with saliva influences sensory perception, although it is not yet clear what rheological property of the liquid is important in predicting perception. **Dr. Bettina Wolf** (*Unilever & Univ. Nottingham*) gave a talk on the rheology of particle stabilised emulsions, and highlighted that shear-thickening occurs at elevated droplet phase volumes that is not observed for classical surfactant stabilised emulsions. **Dr Karen Steel** (*SChEME, Univ Nottingham*) followed with a presentation on the rheology of coal during pyrolysis at temperatures of 350 to 600 °C. She highlighted that coal softens to form a foam before resolidifying, which yields the final porous coke structure but can also lead to excessive pressures in coke ovens. She showed how the combination of high-temperature rheometry with ¹H NMR spectroscopy could be used to understand the morphological changes. **Dr Robert Poole** (*Mech Eng., Univ Liverpool*) presented the shear and extensional rheology of a worm-like surfactant solution. This consisted of an anionic (SDS) and amphoteric (tegobetain) surfactant that showed substantial non-Newtonian characteristics. The extensional properties were characterised using a Capillary Breakup Extensional Rheometer.

During the luncheon interval, numerous posters were displayed and there were plenty of healthy discussions, including consideration on the impact of saliva on the taste and mouthfeel of our lunch ☺.

The next session was for our more *inexperienced rheologists*, whom all gave presentations of a very high quality. **Fotis Spyropoulos** (*Chem Eng., Univ Birmingham*) discussed the rheological and microstructure of aqueous two phase biopolymer-surfactant mixtures. Varying the amount of NaCl in the phase-separating pullulan/SDS mixtures offers the advantage of obtaining pullulan-rich and SDS-rich phases, and that analysis of the rheological data together with the observed structures/images of the mixtures under different shear/composition suggests a close link between the rheology and the changes of morphology of these two-phase systems. **Anson Ma** (*Chem Eng., Univ of Cambridge*) presented the rheology of carbon nanotube suspensions that have diameters of less than 100 nm and a length of several hundred microns; these were suspended in an epoxy resin. The suspension showed an elastic response ($G' > G''$) when no pre-shear was applied, while with pre-shear, the suspension behaved as a viscous fluid ($G'' > G'$) soon after the cessation of flow and finally recovered as an elastic solid in a time scale of thousands of seconds. **Dr. Nuno Sereno** (*Food Sciences, Univ Nottingham*) discussed the physical modification of xanthan gum through thermo-mechanical extrusion. This produces a particulate xanthan material that has improved hydration and unique viscosity enhancing properties that is dependent on the electrolyte levels. Upon heating the xanthan gum reverts into a disordered coil formation similar to non-extruded xanthan gum.

Following the tea break, which included more cakes and biscuits, **Julia Telford** (Unilever Corporate Research) gave a more industry-based presentation about appropriate techniques with which to measure the rheology of structured fluids (e.g. skin creams, sauces, spreads, dressings, ice cream). She highlighted that in many cases, the use of the vane tool is essential to obtain reliable measurements, particularly for highly thixotropic samples, and that careful consideration of the appropriate test procedure is required to obtain true and accurate rheological profiles. Julia also highlighted that the use of the simple 'slump' test could become a useful tool in factory situations to determine the characteristic yield stress of food and personal care products where expensive rheometers are impractical. **Dr. Amir Fahmi** (*SChEME, Univ Nottingham*) highlighted the rheological behaviour of magneto-rheological (MR) materials that have the ability to undergo rapid changes in their viscosity on the application of an external magnetic field. The novel MR fluid consisted of nano- and micro-sized iron particles in a polymer matrix whereby the viscosity is increased by several decades upon application of the magnetic field. The final talk was by **Dr. Yuncheng Liang** on the rheological properties of nano-ceramic suspension in the presence of non-ionic surfactant. The influence of molecular weight of triblock copolymer (PEO, PPO) surfactant on the rheology and zeta-potential of yttria stabilised zirconia was presented.

The day concluded with an **award for the best presentation** from an in-experienced / 'young' rheologist. This was awarded to **Anson Ma** for the high-quality of his scientific work and presentation skills; he receives a series of 'Rheology Reviews' books.

Future BSR Non-Newtonian Club meetings are currently being planned, and if anyone would like host and/or sponsor such an event, please let Jason Stokes (Jason.stokes@unilever.com) know. Anybody wishing to present at future Non-Newtonian club meetings should also contact Jason; this includes students and other less experienced rheologists, industrial rheologists, and academics.

List of Presentations – BSR Non-Newtonian Club Meeting June 6th 2006.

Speaker	Title
Prof. John Mitchell <i>Food Sciences, Univ Nottingham</i>	Mouthfeel and taste perception from thickened foods. What is the relevant rheology ?
Dr. Bettina Wolf <i>Unilever Corporate Research</i>	Shear-thickening of an emulsion stabilised with hydrophilic silica particles
Dr. Karen Steel <i>Chem. Eng. Univ Nottingham</i>	High Temperature Rheology of Coal During Carbonization
Dr. Rob Poole <i>Engineering Univ of Liverpool</i>	Shear and extensional rheology of a wormlike surfactant solution
Fotis Spyropoulos <i>Chem. Eng. Univ Birmingham</i>	Rheological behaviour of aqueous phase-separated polymer-surfactant blends
Anson Ma <i>Chem. Eng. Univ of Cambridge</i>	Carbon Nanotube suspension rheology

Nuno Sereno <i>Food Sciences</i> <i>Univ Nottingham</i>	Physically modified xanthan gum, from particle to polymer rheology
Julia Telford <i>Unilever R&D Colworth</i>	Measuring the Rheology of Structured Fluids
Dr. Amir Fahmi <i>Mech. Eng.,</i> <i>Univ Nottingham</i>	Rheology Behaviour of Magnetorheological Materials: Based on Polymeric Matrix in the Presence of Varying an External Magnetic Field
Dr. Yuncheng Liang <i>Chem. Eng.</i> <i>Univ Nottingham</i>	Rheological properties of nanoceramic suspension in the presence of nonionic surfactant