Spring Meeting of the Section Polymerphysics of the German Physical Society (DPG) and the German Society of Rheology (DRG) in Leipzig, March 1-3, 1999

The 'Mendebrunnen' in front of the 'Gewandhaus', Augustusplatz Leipzig. Designed by Adolf Gnauth (Artist, Nuernberg) and built by Jacob Ungerer (Architect, Munich), it was financed by M.P. Mende (Bordello owner, Leipzig). Inaugurated in 1886.

The Biannual Rheology Meeting of the German Society of Rheology (DRG) was held this year collectively with the spring meeting of the Section Polymer Physics of the German Physical Society (DPG) in Leipzig and was organised jointly by F. Kremer, H. M. Laun, R. Schnabel and M. H. Wagner. The local organizing committee was headed by F. Kremer and G. Fleischer of the University of Leipzig. About 300 participants were informed by 100 lectures and nearly 100 poster contributions about a wide field of polymer physics, rheology and rheometry. This meeting cosponsered by DPG and DRG demonstrated very impressively the interdisciplinary character of polymer rheology connecting numerous fields of chemistry, physics and engineering science. The main topics of the meeting were introduced by plenary and keynote lectures before the thematically well structured special sessions were started. The following subjects of rheology and polymer physics, which have seen a great deal of interest recently, were addressed:

- Rheological properties of complex polymer systems and the influence of surface effects on rheological behaviour of polymer melts,
- Invesigation of the structure and the rheological properties of colloid dispersions, highly concentrated suspensions and analyses of the dynamics of block-copolymer and elastomeric systems,
- Rheometry and other new characterisation methods for the dynamics of polymers and their melts as well as rheo-optical measuring methods for dilute polymer solutions, and
- Non-equilibrium-molecular-dynamics (NEMD) simulations for complex fluids.

After welcome speeches by the organizers of the conference, the scientific program opened with a symposium on rheological properties of polymer systems. J. Klein (Weizmann Institute, Rehovot, Israel) gave a paper on viscous properties of polymer brushes. These systems are particularly interesting since it is possible to reduce dramatically the frictional forces between rubbing surfaces under compression if they are coated by polymer brushes solvated by a good solvent. The viscous drag experienced by the brush layers as they slide past each other were discussed taking into account interpenetration of the brushes and the effective viscosity of the sheared interfacial layers.

In a second presentation, S. Hess (TU Berlin) gave a detailed account on the exciting developments of the NEMD method in his research group over the past ten years. NEMD is an acronym and stands for non-equilibrium molecular dynamics and has been developed in the US in the early eighties. It is a computational method which allows to predict the rheological properties and structural changes in flows of complex liquids such as polymer melts, colloidal dispersions, ferro-fluids, and magneto-rheological fluids.

L. Leger (Collège de France, Paris) reported recent developments on surface anchored polymer layers as a way to adjust adhesion and friction between a polymer melt or an elastomer and a solid. For the PDMS-silica system she presented experiments on how to control the formation of surface anchored layers and to understand the molecular parameters that govern the ability of the surface chains to enhance adhesion or to vary the friction between rubbing surfaces.

The final talk of this first part of the symposium was devoted to shear and elongational rheometry of polymer melts. This contribution

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was given by Prof. J. Meissner (ETH Zürich, Switzerland) who has given the main impetus to this field of research during the past 25 years. After a detailed introduction on the physical fundamentals of polymer rheometry he presented and explained the numerous rheometers which have been developed and built by his students in his laboratory at the ETH.

In the second part of the symposium the contributions of H. C. Öttinger (ETH Zürich, Switzerland) and of G. Eder (Linz, Austria) should be mentioned. The contribution of Öttinger and M. Kröger (ETH Zürich and TU Berlin) was on thermodynamic modeling of polymer melts. In the first part of this talk the GENERIC formalism was presented as a general framework for nonequilibrium thermodynamics (AR Vol. 9 Jan/Feb 99, p. 17) which has been developed by Grmela and Öttinger over the past few years. In the second part it was shown how this formalism can be used to formulate reptation models for polymer melts without the independent alignment assumption, and the experimental consequences were discussed. G. Eder gave a general account of the theoretical description of flow induced crystallization and the complicate relationship between deformation and crystallization in polymer melts. In this connection also the contribution of Prof. H. Janeschitz-Kriegl (Linz, Austria) should be mentioned who reported very interesting new results on crystallization in elongational flow. Furthermore, recent results on rheological properties of quasi-two dimensional emulsions (Th. M. Fischer, Leipzig), ultra sound methods to characterize polymers (I. Alig, Darmstadt), viscoelastic properties of polymer blends (Chr. Friedrich, Freiburg), and Fourier transform rheology of bulk polymers (M. Wilhelm, Mainz) were reported.

The 2nd and 3rd day of the meeting featured plenary lectures by W. Pechhold (Ulm) on new methods for the measurement of dynamical and mechanical material behaviour and by J. Springer (TU Berlin) on rheo-optical experiments on dilute polymer solutions.

The poster session on Tuesday afternoon covered the whole area of research on Polymer Physics and Rheology. Contributions reaching from food rheology (organized by W.-M. Kulicke) to electro-rheological properties of polymers where presented.

Prof. J. Kubat, Göteborg, received the Honorary Membership of the DRG for his devoted services to European rheology. His connection with the DRG dates back to the 2nd meeting of the DRG (Berlin 1952), when he presented a paper "Über rheologische Relaxationsprozesse". He is only the third recipient of this honour, after L. Prandtl and K. Kirschke.

A first was the presentation of the Young Rheologists Award of the DRG for the best publication in 1997/98, which was jointly given to C. Gabriel, Universität Erlangen, and D. Maier, formerly Universität Freiburg.

The social program of the conference consisted of a concert in the Thomaskirche (the church in the centre of the ancient Leipzig where J. S. Bach was active for a long period) and a conference dinner at Auerbachs Keller (a pub with a very special atmosphere that has earned eternal fame through "Faust" – the main work of J. W. von Goethe).

The next meeting of the DRG will celebrate the Golden Jubilee of the German Society of Rheology, and will take place from May 14 to 16, 2001, in Berlin, where the DRG was founded in 1951.

DRG: www.bam.de/partner/drg/drg.html
DPG: www.dpg-physik.de/

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