



YAMAGATA, JAPAN
JULY 2 –6, 2006



The 22nd Annual Meeting of the Polymer Processing Society (PPS-22) was held on July 2-6, 2006, in Yamagata, Japan. This is the third of the PPS meetings held in Japan, following Kyoto (1989) and Yokohama (1998). The PPS annual meeting is one of the largest conference on rheology and polymer processing, and it is the place where researchers from basic rheology to processing applications gather and stimulate with each other. In Yamagata, we had about 550 participants from about 30 countries, and the conference was a great success with stimulating discussions.

There were seven plenary lectures during the conference. The conference opened with the plenary lecture by M.R. Mackley on “Precision Polymer Processing Experiments and their Matching with Numerical Simulation.” He discussed the development and applications of the multipass rheometer, including the observation of the flow birefringence and comparison with the numerical simulation. The second plenary lecture was on “Research on Plastic/Elastomeric Nanoparticle/Inorganic Nanoparticle Ternary

Nanocomposites” by J. Qiao, who discussed a new method of preparing polymer nanocomposites. Then H. Yokoi showed beautiful video of flow visualization in a lecture on “Visualization Analyses of Injection Molding Phenomena inside Mold and Heating Cylinder”. The next lecture was on “REICOFIL Technology - the Unique Process for Spunlaid and Meltblown” by B. Kunze, who discussed the recent development of REICOFIL technology. Then A. N. Hrymak gave a lecture on “Modeling of Free and Moving Interfaces in Polymer Processing”, in which he reviewed the recent progress in mathematical methods for handling free and/or moving interfaces such as volume of fluid method, factious species, and level set methods. The sixth lecture is on “Plastics and Material Innovations for Forthcoming Automobile” by S. Suzuki from Toyota Motor Co., who discussed what kind of innovations must be achieved to make forthcoming automobile environment-friendly. The last lecture is on “The Contribution of the Rheology to Reactive Processing” by P. Cassagnau, this year’s Lamba Award winner. He reviewed his research on reactive processing, especially the study of the diffusion of reactive molecules by rheological measurements.

During the conference, we had 32 keynote lectures, about 400 oral presentations and about 170 poster presentations. They were divided into 12 general symposia (Extrusion, Polymer Alloys and Blends, Composites, Mixing and Compounding and Reactive Processing, Films and Fibers, Green Polymers and Processing Technology, Morphology and Structure Development, Injection Molding and Molds, Modeling and Simulation, Blow Molding and Thermoforming, Joining and Coating, Rheology and Rheometry) and 7 special symposia (Food Rheology and Processing, Foams and related novel processing technologies, Electronics and Optics related Polymers, Polymer Nanotechnology, Process Visualization and On-line Sensing, Micro Molding and Precision Processing, Organic Electronic Materials and Devices).

Since the conference covers very wide range of research field, here I just mention some (but not all) examples of the subjects widely discussed during the conference. Polymeric materials intensively studied include nanocomposites (cray, carbon nanotube, etc.) and green polymers

(biodegradable, biomass-derived, etc.), in addition to various blends and composites. Processing methods discussed by many authors include reactive processing (including in situ polymerization and reactive blending), processing with the aid of super critical fluids, and micro molding. As for the research technique, flow visualizations by various methods have become one of the most important experimental techniques in this field.

There were two keynote lectures in the “Rheology and Rheometry” symposium. The first one was by G. W.M. Peters on “Rheology of Crystallizing Polymers”. He discussed a model of flow induced crystallization which takes account of not only the crystallinity but also the types of the crystallites and their orientation. The second keynote lecture was by S.Q. Wang on “Exploring Nonlinear Flow Behavior of Entangled Polymers as Related to Processing”. By visualization of the flow in a cone-plate rheometer, he has observed that, if the polymer sample is fairly monodisperse and the shear rate is high, the velocity gradient is not uniform across the gap of the rheometer, in contradiction with the standard expectation. Similar phenomena are also observed in an oscillatory shear flow, and raise a fundamental question about the polymer rheology and processing.

One of the subject discussed by many authors is the elongational viscosity of branched polymers. H.K. Rasmussen showed, in his talk on “Elongational Viscosity of Narrow Molar Mass Distribution Star and Pom-Pom Polystyrene”, new experimental data of the elongational viscosities of monodisperse pom-pom polymers. The results have suggested that the backbone chains are extended beyond the limit imposed by the standard pom-pom constitutive model. Other examples of the subjects intensively discussed in the Rheology and related symposia include rheology of nanocomposites, block copolymers, and biodegradable polymers. Another important subject was the rheology of the reacting polymers and applications to the reactive processing.

In the “Modeling and Simulation” symposium, and also in most of the other symposia, various kind of numerical simulations are discussed by many authors. As for flow analysis, research efforts seem to be directed in two major directions. One is the three dimensional simulation with complex geometry, and the other is the flow



of multicomponent fluids such as blends and composites. W.R. Hwang’s keynote lecture “Direct Numerical Simulations of Hard Particle Suspensions in Planar Elongational Flow” is one example. Numerical simulations are used not only for flow analysis but also for the predictions of various material properties. For example, H.E.H. Meijer discussed, in his keynote lecture “Predicting Polymer Properties Directly from Processing Conditions”, the application of solid state rheology and their constitutive model to predict both short and long term mechanical performance of products made from amorphous polymers.

The next PPS meeting, PPS-23, will be held on May 27 – 31, 2007 in Salvador, Brazil. Detail of PPS-23 will be found on the website <http://www.pps-23.com/>.

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