The International Conference on Bio-Based Polymers and Composites 2012 (BiCoPo 2012)

Siófok, Hungary
May 27–31, 2012

The environmental awareness of the society is continuously increasing, and already became an important factor in the development of new materials and technologies. The tendency is recognized also by the European Community, which supports a considerable number of projects in order to accelerate the development of materials satisfying public demand. Three such projects, Biostruct, Forbioplast and Woody, with overlapping scopes focus on the valorization of forest derived resources for the production of bio-based products like polymers, additives and composites with natural reinforcements for various applications including agriculture, automotive, construction, electronics and packaging. The management of the these projects decided to join forces to organize a conference in order to create a possibility to disseminate their results and to increase the efficiency of their research and development by exchanging ideas with leading experts in the field. The International Conference on Bio-based Polymers and Composites (BiPoCo 2012) has been organized for the first – but possibly not the last – time between May 27 and 31, 2012 in Siófok, Hungary, with 230 registered participants, more than 90 oral and 110 poster presentations.

Scientific and technological presentations focused on the theory and practice of bio-based polymers as well as their blends and composites. Rheological characterization of materials is a technique of high importance in polymer science, and also in the field of natural based and biodegradable polymers in particular. Hereunder, we intend to provide a short overview of the main research areas and presentations related to BiPoCo 2012, in which rheology plays a crucial role.

Replacing conventional high performance thermoset materials with bio-based alternatives is an actual challenge for the plastics industry. The curing of these materials can be followed using rheometry, i.e. by monitoring viscosity of the system as a function of either temperature or time. In his presentation "Novel high performance vegetable oil based thermosets" (D.C. Webster, P. Sengupta, X. Pan, T.J. Nelson & A. Paramarta) D.C. Webster described the optimization of the synthesis of a thermoset polymer based on an epoxidized vegetable oil ester, sucrose soyate, using this technique. A similar approach was applied by B. Madsen – "Design of cure cycle conditions for manufacturing of composite materials with a new biomass-based furan resin matrix" (J.C. Domínguez & B. Madsen) – the preparation of a polyfurfuryl alcohol based resin was optimized by fitting the Macosko model to the results of rheological measurements.

Miscibility in polymer blends can be conveniently and effectively characterized based on the composition dependence of viscosity – as the author of the present article emphasized in the second plenary lecture of the conference: "Biopolymer blends: miscibility, compatibility and performance (B. Imre & B. Pukánszky). The authors compared conventional and reactive blending of poly(lactic acid) (PLA) and a linear polyurethane elastomer, using rotational viscosimetry among other techniques. A similar approach has been applied by F. Becquart et al. In the presentation "Polylactic acid or poly(3-hydroxybutyrate-co-hydroxyvalerate) and polyolefins blends compatibilization" (T. Sadik, V. Massardier, F. Becquart & M. Taha), effectivity of the compatibilizer has been confirmed by the increase of complex viscosity in these systems.

Nanocomposites have been a constantly emerging field of research for many years now. Rheometry is a technique widely applied for their structure and properties – biopolymers based systems are not an exception. M. Kracalik in his talk "Effect of layered silicates on rheological, structural and utility properties of PLA nanocomposites" (M. Kracalik, M. Hirschenauer, L. Chitu, G. Maier, S. Laske, M. Washüttl & C. Holzer) compared the effect of clays with different surface treatment on the properties of PLA, suggesting

Figure 1: Participants outside at the pool during a break.

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the formation of a 3D network in the nanocomposites, based on the registered increase of melt elasticity. An innovative technique for the preparation of well dispersed nanocomposites systems by the in-situ ring opening polymerization of PLA from the surface of functionalized silica nanoparticles has been presented by A. Prebe: "Biosourced polymer-based nanocomposites: Environmental friendly approaches from sol-gel chemistries" (A. Prebe, P. Cassagnau & J-F. Gérard). The reaction was followed by chemiorheology, thus time dependence of the complex modulus and viscosity gave the basis of structural characterization.

The Organizing Committee intended to provide the scientific community with the opportunity to present their latest results for discussion at a worldwide forum, to create a friendly atmosphere for socializing and strengthening personalities. The event offered young scientists an opportunity to present their work and interact with the community, enabled scientists from all parts of the world to meet and discuss issues of common interest and establish worldwide scientific activities. Feedback from the participants has been extremely positive, thus BiPoCo 2012 might be the first of a series of conferences on bio-based polymers and composites.

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