

The Symposium entitled “Layered Nanostructures – Polymers with Improved Properties” was held May 12th to 13th, 2009, at the Leucorea in Lutherstadt Wittenberg, Germany. It was the 13th event of a series of symposia named “Electron Microscopy in Materials Science” organized by the Chair of General Materials Science at the Institute of Physics and the Institute for Polymeric Materials e.V. (IPW) at the Martin Luther University Halle-Wittenberg. The series was initiated in 1994, starting as a micro-symposium dedicated to the technical and methodical advances of electron microscopy and their applications in materials science, especially in polymeric materials. During this period, the development of nanostructured polymeric systems brought, both, an upcoming, interesting scientific field and new challenges to those scientists engaged in morphological and micromechanical analyses. Previous symposia of the series covered polymeric materials like block copolymers with new molecular architectures, nanocomposites, polymer blends, toughened polymers, semicrystalline polymers, layered polymers manufactured by forced assembly, and others. The transition from micro- to nanoscopic scales in the tailored structuring of polymers led to a rapid development of microscopic techniques and preparation methods. The application of scanning force microscopy for the morphological and micromechanical characterization of polymers, the progress in environmental scanning electron microscopy (ESEM) in materials science, the adoption of “in situ” techniques and advances in ultramicrotomy as an important preparation technique are some examples.

The main focus of the 13th Symposium was placed on recent developments of new materials by the clever combination of stiff (or “hard”) and ductile (or “soft”) components in the form of thin, alternating layers. Such structures composed of alternating thin layers are known from antique laminated or layered steel, the Damascus

sword steel, or from nature, such as the abalone shells. All of those multilayered structures have one thing in common: they possess excellent mechanical properties. Inspired by these composite structures present in materials science and in nature, polymer scientists are nowadays trying to create similar morphologies. Therefore, there was an intensive discussion on critical dimensions of such structures on the micro- and nanoscopic level, resulting micromechanical mechanisms at deformation and fracture, and on the correlation to the macroscopic mechanical properties. One section of the 13th Symposium emphasised biological materials and biomedical materials for regenerative medicine. Moreover, the symposium provided a podium for the presentation and discussion of new fields of application for up-to-date electron microscopic and preparation techniques, such as energy filtering electron microscopy (EFTEM) and focused ion beam (FIB) technology.

Leading scientists as well as young academics from Germany, Spain, Poland, Czech Republic, Switzerland, France, Egypt, Nepal, India, Romania and the United States presented and discussed the latest results of their scientific work. The scientific exchange will be continued in the 14th Symposium entitled “Nanostructured Polymers/Nanocomposites” taking place in Halle/Saale, Germany, May 18th to 19th, 2010.

The four Chapters of this edition are covering the main subjects of the symposium, including Chapter I: Methods to Study Nanostructured Polymers (C.J.G. Plummer, A. Heilmann), Chapter II: Layered Polymeric Systems by Forced Assembly and Self Organization (E. Baer, S. Scholtyssek, R. Adhikari), Chapter III: Semicrystalline Polymers (A. Galeski, A. Frick, M. Mikoszek), and Chapter IV: Nanostructured Biomaterials (J. Brandt, M. Petrtyl, T. Groth, Imam Khasim H.R., A. Asran).

The organizers would like to thank the sponsors of the 14th Symposium “Electron Microscopy in Materials Science”:

- Martin Luther University Halle-Wittenberg
- Institute for Polymer Materials IPW
- at the Martin Luther University Halle-Wittenberg
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- Fonds der Chemischen Industrie
- Lutherstadt Wittenberg

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Participants of the 13th Symposium "Electron Microscopy in Materials Science" on the topic "Layered Nanostructures – Polymers with Improved Properties"