

Carnegie Mellon

Materials Science and Engineering Seminar Series:

Professor Michael Bockstaller

Department of Materials Science and Engineering
Carnegie Mellon University

"When hard meets soft – Polymer Science at MSE"

Friday, March 3, 2006

11:00 A.M. Seminar in Baker Hall 136A

Refreshments precede seminar at 10:30 A.M. in the R. F. Mehl Room (2325 Wean Hall)

This presentation will present the major research themes that are currently being pursued in our laboratory – microstructured composite materials and polymer electrolytes. Emphasis will be on motivation and concepts rather than technical detail. The first part of the talk will focus on polymer nanocomposite materials that currently represent one of the fastest growing areas in material science. Nanometer-sized filler materials – with their inherently large surface-to-volume ratios – are particularly interesting as filler additives since they facilitate increasing efficiency of a given property (*i.e.* less filler is needed to achieve a desired property enhancement). The importance of morphological control to fully exploit the potential of nanocomposite materials has fueled interest in structure-guiding matrix materials, such as block copolymers (BCP) as scaffolds for material architecture. The talk will highlight structure-property relations in nanocomposite materials and discuss strategies for future work. The second part of the talk will focus on the area of polymer electrolytes and structure formation in polymer-electrolyte solutions. Hydrogen bonding will be identified as key parameter that determines the characteristics of polymer-salt solutions. The challenge of predicting properties of water will be discussed and a generalized Flory-Huggins model will be presented that adequately predicts the formation of hydrogen bonds in water.

Professor Bockstaller received his diploma in Chemistry from the Technical University of Karlsruhe (Germany) and his Ph.D. in Physical Chemistry from the Johannes Gutenberg University (Mainz, Germany). He was scientific assistant at the Max-Planck Institute for Polymer Research (Mainz, Germany) and postdoctoral associate at the Department of Materials Science and Engineering at Massachusetts Institute of Technology. He came to Carnegie Mellon from the Technical University of Aachen (Germany) where he held a Habilitation position. He is a fellow of the Alexander von Humboldt foundation and Emmy Noether grant recipient of the German Science Foundation.