

# UNH Materials Science Seminar

11:10-12:00, Thursday, October 18, 2007

Kingsbury Hall S145

University of New Hampshire

## Polyurethane foams reinforced by carbon nanotubes

Dr. Michal Kacperski

UNH Materials Science Program

In this talk I will present results of our work on reinforced polyurethane foams. Multiwall carbon nanotubes (MWCNT) were used as reinforcement for the foams. To ensure better dispersion in polyol and higher adhesion with PU matrix, MWCNT were modified by acid treatment with the goal of adding reactive functional groups on the surface of the carbon nanotubes. The viscosities of the CNT dispersions in the polyol with different concentrations were measured under increasing shear rate using a dynamic rheometer. Significantly increase in viscosity was observed (up to 100 times when compared with control polyol). Shear-thinning characteristics were observed for prepared dispersions (viscosity of prepared dispersions decreases with increasing shear rate). In the next part of our research, dispersions of MWCNT in polyol were formulated with water, catalyst, surfactant and isocyanate to prepare polyurethane foams. The content of MWCNT in foams was less than 2 wt. %. The compressive strengths and moduli of the foams were tested using a DMA and universal testing machine. Foams containing MWCNTs showed an increase in both compressive strength and modulus at low MWCNT loading. Compressive strength was observed to be up to 2 times

higher than unloaded foams. It was also observed that foams based on modified MWCNT have higher compressive strength and modulus than foams based on unmodified carbon nanotubes.

Dr. Kacperski earned his M.Sc. and Ph.D. degrees at the Polymer Institute of the Szczecin University of Technology, Poland. He carried out polymer research at the King Abdul Aziz City for Science and Technology in Riyadh, Saudi Arabia, and is currently a Visiting Assistant Professor in the UNH Materials Science Program.