



BILKENT UNIVERSITY

unam - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY

FACULTY OF SCIENCE

**MATERIALS SCIENCE and NANOTECHNOLOGY
GRADUATE PROGRAM SEMINAR**

“Interface Structure of Thin Polymer Films by X-ray and Neutron Scattering”

Dr. Bulent Akgun

NIST Center for Neutron Research
Gaithersburg, MD, USA

Thin polymer films have wide variety of technological applications in coating, fuel cells, organic solar cells and in nanolithography. Besides their technological importance, the behavior of polymer chains at or near interfaces is different than their behavior in bulk. As the thickness of the films approach nanometers, the effect of the surface and interfaces dominate the film's properties. The thin film characterization challenges can be overcome by X-ray and neutron scattering since their wavelengths match the length scales studied and they provide sub-nm resolution. In this presentation, I will show some of our recent studies of how the important scientific questions about the structure of thin polymer films can be addressed mainly using scattering techniques.

We have studied the stimuli-responsive behavior of diblock copolymer brushes (DCBs). The surface properties of DCBs can be changed reversibly from those characteristic of one polymer block to those characteristic of the other one by treating the DCBs with a selective solvent. We have used neutron reflectivity and grazing incidence small angle x-ray scattering to resolve the mechanism of surface rearrangement of DCBs synthesized by atom transfer radical polymerization. Another interesting stimuli-responsive system is polyelectrolyte multilayers deposited by layer-by-layer self assembly. We have studied the pH-driven controlled release of poly(methacrylic acid) (PMAA) chains from a polyelectrolyte multilayer blend films. We demonstrated that the interaction between the polyelectrolyte chains can be tuned by changing the pH and the blend composition and PMAA chains can be released without completely destroying the film.

Date : November 17, 2009 (Tuesday)

Time : 15:40

Place : Faculty of Science Building, A Block, Seminar Room (SA 240)

Tea and cookies will be served after the seminar