PROGRESS REPORT FOR AINGRA05061P

Our main objective is to determine the adsorbed structure of the diblock copolymer poly(2-vinylpyridine)-poly(ethylene oxide) at a quartz/solution interface.

The neutron scattering experiments carried out at ANSTO were aimed at determining the adsorbed conformation of a self-associating di-block co-polymer and the silica solution interface. Unfortunately, however, no results were obtained. The neutron scattering data implied that there was no silica-adsorbed polymer, which contradicts all other experiments we have done with this system using spectroscopic and adsorption-detection techniques. We concluded that there was insufficient contrast between the silica substrate and the PEO block of the polymer under study to allow detection using the neutron source at ANSTO. Our difficulties with this initial study did, however, spur us to further collaboration between ANSTO and the University of Melbourne on this project and we were successful in gaining financial support from NIST to study the micellisation of the polymer in solution. The results from this work have enabled us to determine the structure of a polymeric micelle in solution. These results are the first of their kind, to our knowledge, and highlight marked difference in structure and stability between polymeric micelles and surfactant micelles. Specifically we have found that polymeric micelles are extremely stable in solution and are not dynamic in their structure over a large range of solution pH’s. This finding has great significance for potential applications of polymeric micelles as encapsulation devices for which stability is essential.

A Small-Angle Neutron Scattering study of micellar solutions of poly(2-vinylpyridine)-poly(ethylene oxide), manuscript in preparation


Expected conferment date: December 2007.