

MAR08-2007-003620

Abstract for an Invited Paper
for the MAR08 Meeting of
the American Physical Society

Stimuli Responsive Vesicles, Micelles and Rods from Polypeptide-based Block Copolymers

DANIEL SAVIN, University of Vermont

The self-assembly of amphiphilic block copolymers is dictated primarily by the balance between the hydrophobic core volume and the hydrophilic corona. In these studies, amphiphilic block copolymers containing poly(lysine) (P(Lys)) blocks were synthesized and their solution properties studied using dynamic light scattering, circular dichroism spectroscopy and transmission electron microscopy. The hydrophobic block used was either poly(butadiene) or a statistical copolymer of propylene oxide and ethylene oxide. The latter polymer exhibits a tunable critical point, below which the block copolymer is in the “double hydrophilic” limit. In these multiply-responsive materials, we exploit secondary structure changes that occur within the P(Lys) chain to observe changes in solution morphology as a function of solution conditions. At high pH, the P(Lys) chain assumes either an α -helical or β -sheet conformation depending on temperature, while at lower pH the side chains become protonated, resulting in an expanded coil configuration. The effect of morphology changes due to these structural transitions will be discussed in the context of the interfacial curvature changes with pH and temperature. These dynamic materials have potential applications as viscosity modifiers, liquid crystals and gels.