

109a Structure - Property Relationships in Amphiphilic Block Copolymer Solutions

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Amphiphilic block copolymers of the poly(ethylene oxide)-poly(propylene oxide) (PEO-PPO) family are well-known to self-assemble into (core-shell spherical) micelles and (cubic, hexagonal, and lamellar) lyotropic liquid crystals in water. We are interested on how the aqueous phase behavior and structure of these polymeric amphiphiles can be modulated by the addition of polar organic solvents or solutes (e.g., glycerol, glucose, ethanol, propylene carbonate, triacetin). Our studies (i) probe the amphiphile organization in both micellar solutions and lyotropic liquid crystals, (ii) combine macroscopic observations (e.g., concentration-temperature micellization phase boundaries, ternary isothermal amphiphile-water-cosolvent phase diagrams) with microscopic measurements (from small-angle neutron and X-ray scattering), and (iii) aim to relate the type of structure formed and its properties to the relative swelling of the polymer blocks and to the location of the solvent/solute in the amphiphile assembly. Modulation of structure-property relationships in amphiphile-containing media is central to formulation of pharmaceuticals and personal care products.