EXCLUDED VOLUME INTERACTIONS BETWEEN CORONAL CHAINS IN BLOCK COPOLYMER MICELLES: A SANS AND SIMULATION STUDY

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Block copolymers are constituted of two chemically distinct polymer blocks covalently bonded together. When dissolved in a solvent which is a selective solvent for one blocks, micelles are formed with a core of the non-soluble parts and a diffuse corona of the soluble chains. The small-angle scattering data from such systems can be analysed to relatively high resolution using the scattering functions recently determined by analytical methods and Monte Carlo simulations. First, an investigation of Pluronic micelles of poly(ethylene oxide) - poly(propolene oxide) - poly(ethylene oxide) by SANS is presented. In this work a simple analytical model with non-interacting corona chains can be used. In another project we have studied micelles of d-polystyrene-polyisoprene of relatively high molecular weight (12000-48000, 40000-40000 and 40000-80000) in decane, which is a strongly selective solvent for polyisoprene. In order to obtain as much information as possible on the structure, neutron contrast variation measurements can be performed on polymers with one of the blocks per-deuterated. Using deuterated and hydrogenated solvent, the core and the corona can be measured separately, whereas mixtures provides additional information on the interference term. The analysis of the data provides information on shape, aggregation number, polydispersity, core size, core solvation, corona shape/size and on the interactions between the chains in the corona, which are significant for these micelles.