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Self-assembled Structures of a Multifunctional, Structured Block Copolymer in Solution; A SANS Study THUSITHA ETAMPAWALA, MANJULA SENANAYAKE, NARESH OSTI, Clemson University, LILIN HE, HFIR, Oak Ridge National Laboratory, WILLIAM HELLER, SNS, Oak Ridge National Laboratory, DVORA PERAHIA, Clemson University — The self-assembly of multi block copolymer in solutions is controlled by a delicate balance between inherent phase segregation due to incompatibility of the blocks and the interactions of the individual blocks with the solvent. We investigated the association of ABCBA penta-block copolymers, in solution using Small angle neutron scattering (SANS). The ABCBA penta-block comprises of centered randomly sulfonated polystyrene block to which rubbery polyisoprene is connected, terminated by blocks of polystyrene decorated with tertiary butyl group, kindly provided by Kraton LLC. The SANS studies have shown that the penta-block forms ellipsoidal core-shell structures with the sulfonated polystyrene in the core and Gaussian decaying chains of swollen polyisoprene and tertiary butyl polystyrene in the corona. The size of the micelle, the thickness of the corona and the aggregation number increased with increasing the solution concentration and temperature, while the solvent fraction in the core decreased. The dilute solutions promptly responded to thermal fluctuations. However, the temperature effects disappeared with increasing the solution concentration.

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