

## **Structural analysis of self-assembled block copolymer systems using small angle neutron and x-ray scattering techniques**

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Various nanostructure and nanoscale building blocks are being fabricated using soft-materials targeting unique physical, chemical, and mechanical properties by controlling orientations, densities, or locations of constituting molecules via self-assembly. In this talk, we demonstrate self assemblies of functionalized carbon nanotubes and conjugate polymers, respectively, within polymeric templates formed by block copolymer solutions. Especially, by taking advantage of the temperature dependent phase behavior of block copolymers in water, thermos-responsive self-assembled structures are demonstrated. Small angle x-ray scattering combined with small angle neutron scattering provided structural information on these self-assembled and ordered systems that is much more than just periodic length scales. The scattering contrast provided by the neutron and x-ray, without the need of deuterating polymers, helped identify the distribution of conjugate polymers in the template, which showed unique thermos-reversible conductive property.