

***CHANGES IN MESOSCOPIC ARRANGEMENT OF PHYSICAL GELS
IN RESPONSE TO SHEAR AND DEFORMATION AS REVEALED BY
SYNCHROTRON EXPERIMENTS***

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Whereas blends from chemically distinct polymers A and B tend to phase separate on a macroscopic length scale, phase separation in case of A-B block copolymers is limited by the macromolecular dimensions of the covalently linked polymer blocks. Characteristic dimensions of mesoscopic structures formed by copolymers range from 1...100nm, thus small angle X-ray scattering represents the most important tools to study the nano-sized morphologies. Relaxation processes, associated with changes in external parameters like temperature, deformation or shear are therefore dominated by the typical relaxation times of molecular assemblies rather than individual macromolecules. Thus, in particular when considering changes in mesoscopic morphologies in response to changes of external parameters, SAXS experiments rely on synchrotron radiation.

This contribution addresses the morphologies formed in solutions of triblock copolymers. These systems tend to form physical gels with complex morphology that highly depends on processing history. The results from in-situ synchrotron experiments revealed that, depending on the applied shear conditions, they form assemblies wherein the physical crosslink points form highly ordered arrays. SAXS studies on such systems under the influence of uniaxial deformation clearly revealed the changes in small angle diffraction patterns that can be interpreted in terms of changes in the arrangements under the influence of external stress.