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Kinetics and Dynamics of HEX to Gyroid Transition of a Diblock Copolymer in Selective Solvent JULIAN SPRING, YONGSHENG LIU, RAMA BANSIL, Boston University — Synchrotron based time-resolved small angle x-ray scattering (SAXS) was used to study the kinetics of the formation of a gyroid phase in solutions of a poly (styrene -isoprene) diblock copolymer in dimethyl phthalate, a selective solvent for the polystyrene block. From temperature ramp measurements on an 80% (w/v) sample, a hexagonally-packed cylinders (HEX) phase was identifed below 95 C,while a gyroid formed above 95C. The kinetics of the transitions from HEX to gyroid was examined using temperature jump and ramp experiments over the temperature range of 50-150C. In addition, x-ray photon correlation spectroscopy was used to study the dynamics of the HEX and Gyroid phases, as well as the transition regime. Analysis of the time evolution of the Bragg peaks to follow the kinetics of the transition between these phases will be presented, in addition to analysis of the dynamics of this sample throughout the phase space under investigation. The formation of the Gyroid structure was also modeled using Molecular Dynamics (MD) simulations, and the results of these simulations will also be presented.

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