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Analysis of Relaxation Spectra and Influence of Molecular Weight on the Dynamics of Block Copolymers[1] VAIDYANATHAN SETHURAMAN, VENKAT GANESAN, Univ of Texas, Austin — We use molecular dynamics simulations to study both the normal mode dynamics of block copolymers and the influence of MW on the dynamics of the block copolymer. We considered two models to isolate the specific effects arising from the morphological ordering and mobility disparities between the blocks. We effected an explicit normal mode analysis of the chain dynamics in the ordered phases in the directions parallel and perpendicular to the plane of the lamella. For systems with no mobility disparity between the blocks, our analysis demonstrates that the normal modes and their relaxations in the planes parallel and perpendicular to the lamella exhibit significant deviations from the Rouse modes. For systems in which the mobility of one of the blocks was frozen in the lamellar phase, the normal modes closely resembled the Rouse modes for tethered polymers. To understand the spatial inhomogeneities in segmental dynamics of lamellar diblock copolymer systems we probed the local average relaxation times and the dynamical heterogeneities as a function of distance from the interface. Scaling of our results indicate that the interfacial width of the ordered phases serves as the length scale underlying the spatial inhomogeneities in segmental dynamics of the fast monomers.

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Vaidyanathan Sethuraman
Univ of Texas, Austin

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