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Does Coarsening Begin During the Initial Stages of Spinodal Decomposition? NITASH BALSARA, TIMOTHY RAPPL, University of California, Berkeley — We have studied the early stages of spinodal decomposition for a critical 50/50 binary blend of high molecular weight rubbery polymers by time-resolved small angle neutron scattering. Many aspects of the data are described by the well-established linearized theory of Cahn, Hilliard and Cook. In this theory, the time-dependent scattering profiles are given by three time-independent but wave vector (q) dependent functions: the initial structure factor [$S_0(q)$], the terminal structure [$S_t(q)$], and a kinetic parameter [R(q)]. Phase separation leads to a periodic bicontinuous structure with a well-defined lower cut-off. This lower cut-off is characterized by a pole in $S_t(q)$ and $R(q)$=0. The linearized theory also predicts a wave vector (q_{peak}) corresponding to a maximum in $R(q)$. Our experiments do not support this prediction. Instead, the scattering peak decreases linearly with timer indicating that coarsening occurs throughout the initial stages of spinodal decomposition.

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