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Influence of side-groups on the non-equilibrium dynamics of semi-crystalline polymer films

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Combining different polymers lead to a wide range of phase behavior. At rapid processing conditions (during preparation or flow), polymers are squeezed/deformed at various length scales and exhibit significantly different properties. The extent of deformation and the variation in properties depend on how the polymer responds to such rapid processing conditions and is related to the molecular details of the polymer. Molecular architecture, composition, and molecular size control polymer–polymer phase characteristics.Binary mixtures and diblock copolymers exhibiting macrophase separation and microphase segregation are concepts that are fairly well understood at the moment. The study uses dewetting experiments on non–equilibrium semi–crystalline polymer films to investigate the inter-relationship of structure and visco-elastic behavior. At higher dewetting temperatures, it is worth investigating why isotactic poly(para-methylstyrene) (iPpMS) films have exhibited a decrease in dewetting velocity with increase in temperature.

Summary

Activation energies characterizing the relaxation of preparation-induced residual stresses seem not to be affected by the size of the side groups. However, in comparison to iPS, iPpMS exhibit reduced energy barrier for flow indicating that the transient clusters of monomers have short lifetime in iPpMS.

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