

Abstract Submitted
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Diblock copolymer thin films: Compressed fluid induced order

PETER GREEN, ABRAHAM ARCEO, University of Michigan — We show that liquid and super critical CO₂ induces long-range order into thin film, symmetric, polystyrene-b-polymethylmethacrylate (PS-b-PMMA) diblock copolymers, supported by SiO_x/Si substrates, in a temperature range where both bulk and thin films of these materials remain ordered. Under vacuum conditions the substrate induces order the thin films at temperatures significantly above the bulk order-disorder transition temperature. Ordering occurs at $\chi N=7.94$, where χ is the Flory-Huggins interaction parameter and N is the degree of polymerization, which is below the bulk value of $(\chi N)_{bulk}=10.5$. In the presence of CO₂, the transition shifts to yet lower values of χN , indicating a more significant degree of incompatibility between the PS and PMMA components under these solvent conditions. This behavior is in contrast to bulk systems, where the PS-b-PMMA systems of $\chi N>10.5$ become phase mixed in the presence of liquid or super critical CO₂.

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