

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Ordering transition of block copolymer films under compressed CO₂ ABRAHAM ARCEO, PETER F. GREEN, University of Michigan — It is well-known that a bulk, symmetric, A-b-B diblock copolymer forms a lamellar morphology, with period L , below an order-disorder transition temperature (TODT), for $XN < 10.5$; X is the Flory-Huggins interaction parameter and N is the degree of polymerization of the copolymer. The ordering temperatures of poly(styrene-*b*-methyl methacrylate) (PS-*b*-PMMA) thin film diblock copolymers of thickness ca. $2L$, supported by SiO_x/Si substrates, in vacuum environments, are shown to increase beyond the bulk, having unusually large shifts of the transition temperature with small changes of XN . We find that in compressed CO₂ environments, these films are ordered at temperatures where the films are disordered in vacuum (or air) environments. This latter observation is of particular significance because small molecule diluents, including compressed CO₂, are known to decrease the TODT of the bulk (enhanced miscibility). We will discuss these results in light of the thin film compressibility and preferential sorption of the individual blocks at the experimental conditions.

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Date submitted: 04 Dec 2005

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