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Effects of supercritical carbon dioxide on immobile bound polymer chains on solid substrates[1] MANI SEN, Stony Brook University, MITSUNORI ASADA, Kuraray Co., NAISHENG JIANG, MAYA K. ENDOH, Stony Brook University, BULENT AKGUN, SUSHIL SATIJA, Center for Neutron Research, NIST, TADANORI KOGA, Stony Brook University — Adsorbed polymer layers formed on flat solid substrates have recently been the subject of extensive studies because it is postulated to control the dynamics of technologically relevant polymer thin films, for example, in lithography. Such adsorbed layers have been reported to hinder the mobility of polymer chains in thin films even at a large length scale. Consequently, this bound layer remains immobile regardless of processing techniques (i.e. thermal annealing, solvent dissolution, etc). Here, we investigate the use of supercritical carbon dioxide ($scCO_2$) as a novel plasticizer for bound polystyrene layers formed on silicon substrates. In-situ swelling and interdiffusion experiments using neutron reflectivity were performed. As a result, we found the anomalous plasticization effects of $scCO_2$ on the bound polymer layers near the critical point where the anomalous adsorption of CO_2 molecules in polymer thin films has been reported previously.

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