Phase Behavior of poly(2-vinyl pyridine)-block-poly(4-vinyl pyridine) Copolymers SUNG HYUN HAN, DONG HYUN LEE, JIN KON KIM, Pohang Univ of Science and Technology — Phase behavior of a block copolymer depends on the volume fraction \( (f) \) of one block, total degree of polymerization \( (N) \), and the segmental interaction parameter \( (\chi) \). Recently, we found that the order-to-disorder transition temperature \( (T_{ODT}) \) of polystyrene-block-poly(2-vinylpyridine) copolymer (PS-P2VP) was much lower than that of PS-block-poly(4-vinylpyridine) copolymer (PS-P4VP) at similar values of \( f \) and \( N \). The only difference between PS-P2VP and PS-P4VP is the different location of the nitrogen group in phenyl ring (2 versus 4-position). In this study, we studied, via small angle X-ray scattering (SAXS), rheometry, and birefringence, the phase behavior P2VP-block-P4VP copolymers (P2VP-P4VP) with various \( f \) and \( N \). We determined the temperature dependence of \( \chi \) between P2VP and P4VP from SAXS profiles in the disordered states with the aid of the random phase approximation. We found that the value of \( \chi \) between P2VP and P4VP was relatively large. For instance, it is larger than \( \chi \) between PS and P2VP. Thus, even when the molecular weight of symmetric P2VP-P4VP is ca. 12000, the \( T_{ODT} \) is larger than 280 °C. This work was supported by Creative Research Initiative Program supported by KOSEF.

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