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**Phase Behavior and Dimensional Scaling of Symmetric Block Copolymer-Homopolymers Ternary Blends in Thin Films** GUOLIANG LIU, MARK STOYKOVICH, SHENGXIANG JI, PAUL NEALEY, Department of Chemical and Biological Engineering, University of Wisconsin-Madison, 1415 Engineering Drive, Madison, WI, 53706 — We have studied the phase behavior and dimensional scaling of symmetric ternary blends of PS-*b*-PMMA block copolymers and the respective PS and PMMA homopolymers in thin films. Below the order disorder transition (ODT) temperature, the symmetric ternary blends form lamellae, microemulsion and macrophase separated phases as a function of  $\chi N$ ,  $\alpha$  (ratio of degree of polymerization of homopolymers to that of the block copolymer), and  $\phi_H$  (volume fraction of homopolymers). The phase transition compositions from lamellae to microemulsion and from microemulsion to macrophase separation depend weakly on  $\chi N$  and  $\alpha$  in the range of  $12.7 \leq \chi N \leq 37.6$  and  $0.20 \leq \alpha \leq 0.99$ . The dimensions of swollen lamellae and microemulsion ( $L_B$ ) can be determined as a function of  $\phi_H$  and  $\alpha$ , explicitly,  $L_B = L_o / (1 - \phi_H)^\beta$ , where  $L_o$  is the natural bulk period of pure block copolymer, and  $\beta$  is a parameter depending strongly on  $\alpha$ .

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