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The Effect of Copolymer Composition on the Dynamics of Random Copolymers of Styrene and Methylmethacrylate in a PMMA Matrix: A Neutron Reflectivity Study SUDESH KAMATH, MARK DADMUN, University of Tennessee, WILLIAM HAMILTON, Oak Ridge National Lab, MICHAEL ARLEN, Wright Patterson Air Force Research Lab — The effect of copolymer composition on their dynamics in a homopolymer matrix have been studied using specular neutron reflectivity (NR). Four random copolymers containing 50, 54, 67 and 80 % MMA were studied at 10 % wt loading in d-PMMA. The mutual and tracer diffusion coefficients, the effective friction coefficients, and the relaxation times for these copolymers were determined. The results demonstrate that copolymer composition has a significant impact on their dynamics. Analysis of the friction factor using the Lodge-Mcleish model indicates that the local composition around a copolymer is richer in Styrene than the model predictions. We attribute this to the fact that the model uses only chain-connectivity to calculate the self-concentration and ignores contributions due to thermodynamic interactions between the two blend components. Our data indicate that the local environment around a copolymer is richer in styrene. This is in agreement with our simulation results and indicates that the styrene monomers in the copolymer aggregate together to minimize contact with the PMMA matrix.

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