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Diffusion of liquid polystyrene into glassy poly(phenylene oxide) characterized by DSC[1] LINLING LI, XIAOLIANG WANG, DONGSHAN ZHOU, GI XUE, Department of Polymer Science and Engineering, Nanjing Univeristy — We report a diffusion study on the polystyrene/poly(phenylene oxide) (PS/PPO) mixture consisted by the PS and PPO nanoparticles. Diffusion of liquid PS into glassy PPO (l-PS/g-PPO) is promoted by annealing the PS/PPO mixture at several temperatures below Tg of the PPO. By tracing the Tgs of the PS-rich domain behind the diffusion front using DSC, we get the relationships of PS weight fractions and diffusion front advances with the elapsed diffusion times at different diffusion temperatures using the Gordon-Taylor equation and core-shell model. We find that the plots of weight fraction of PS vs. elapsed diffusion times at different temperatures can be converted to a master curve by Time-Temperature superposition, and the shift factors obey the Arrhenius equation. Besides, the diffusion front advances of l-PS into g-PPO show an excellent agreement with the t1/2 scaling law at the beginning of the diffusion process, and the diffusion coefficients of different diffusion temperatures also obey the Arrhenius equation. We believe the diffusion mechanism for l-PS/g-PPO should be the Fickean law rather than the Case II, though there are departures of original linearity at longer diffusion times due to the limited liquid supply system.

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