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Dielectric Spectroscopy of Miscible Polymer Blends WENJUAN LIU, RALPH H. COLBY, Materials Science and Engineering Department, Penn State University, JANE E. G. LIPSON, Department of Chemistry, Dartmouth College — Segmental dynamics are studied in two miscible polymer blends; both involve polystyrene, which has sufficiently small polarizability to be ignored in dielectric spectroscopy. One blend is with poly (vinyl methyl ether) where the low- T_g component is seen in dielectric response and the other blend is with tetra-methyl BPA-polycarbonate where the high- T_g component dominates the dielectric response. Both blends have reasonably disparate glass transitions, and both are weakly interacting. The glass transition temperature (T_g), linear viscoelasticity and dielectric spectroscopy of the pure components and blends, respectively, are measured by differential scanning calorimetry, Rheometric Scientific ARESTM Rheometer and Novocontrol Broadband Dielectric Spectrometer in the frequency range of $10^{-2} \sim 10^6$ Hz. We compare the experimental results with a prediction for the relaxation spectrum obtained using a simple lattice model, wherein we generate a distribution of environments around a given segment in the blend which leads to a prediction for that component's dielectric relaxation spectrum. We show that it is possible to model the dielectric relaxation spectrum by considering concentration fluctuations at the scale of the Kuhn length (the shortest Rouse mode), which we take to be both composition and temperature independent.

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