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Broader Understanding of Multiple Component Dynamic Processes in Miscible Polymer/Polymer Blends RAVI SHARMA, HENGXI YANG, PETER GREEN, University of Michigan — Utilizing two different experimental techniques, isothermal frequency sweeps and isochronal temperature sweeps, in broadband dielectric spectroscopy can allow for the identification of multiple processes derived from the same relaxation mechanism in certain polymer/polymer blends. A study of poly(vinyl methyl ether) (PVME) in bulk, miscible blends with polystyrene (PS) gives evidence of two separate relaxation processes associated exclusively with the segmental dynamics of PVME; the α_0 process from the temperature sweep, related to average segmental dynamics, and the α' process from the frequency sweep, related to relaxations confined within “frozen” domains. The appearance of multiple processes is driven by compositional heterogeneity, mainly chain connectivity and concentration fluctuation effects. Analysis of the breadth and intensity of the dielectric loss curves gives insight into the structure and thermodynamics of the blend, which in turn can explain temperature and composition dependent dynamic trends. These results are contrasted with other miscible blend systems, polyisoprene (PI)/poly(4-tert-butylstyrene) (P4tBS) and polyisoprene (PI)/polyvinyl ether (PVE).

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