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Dynamics of Disordered PI-PtBS Diblock Copolymer HIROSHI WATANABE, Kyoto University — Viscoelastic (G^*) and dielectric (ε'') data were examined for a LCST-type diblock copolymer composed of polyisoprene (PI; M = 53K) and poly(*p-tert-* butyl styrene) (PtBS; M = 42K) blocks disordered at $T \leq 120\text{C}^\circ$. Only PI had the type-A dipole parallel along the chain backbone. Thus, the ε'' data reflected the global motion of the PI block, while the G^* data detected the motion of the copolymer chain as a whole. Comparison of these data indicated that the PI block relaxed much faster than the PtBS block at low T and the dynamic heterogeneity due to PtBS was effectively quenched to give a frictional nonuniformity for the PI block relaxation. The ε'' data were thermo-rheologically complex at low T, partly due to this nonuniformity. However, the block connectivity could have also led to the complexity. For testing this effect, the ε'' data were reduced at the iso- frictional state defined with respect to bulk PI. In this state, the ε'' data of the copolymer at low and high T, respectively, were close to the data for the star-branched and linear bulk PI. Thus, the PI block appeared to be effectively tethered in space at low T thereby behaving similarly to the star arm while the PI block tended to move cooperatively with the PtBS block at high T to behave similarly to the linear PI, which led to the complexity of the ε'' data. The PtBS block also exhibited the complexity (noted from the G^* data), which was well correlated with the complexity of the PI block.

Hiroshi Watanabe
Kyoto University

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