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Decoupling of Relaxation Processes in Dynamics of Macromolecules ALEXANDER AGAPOV, Polymer Science Department, University of Akron, Akron, OH 44325-3909, ALEXEI SOKOLOV, Chemical Sciences Division, ORNL and Chemistry Department, University of Tennessee, Knoxville, TN 37996-1600 — The presented research is focused on studies of the microscopic parameters that control different relaxation phenomena in polymer melts and protein solutions. We analyze the influence of intermolecular interactions on the structural and chain relaxations and on the ionic conductivity in polymers. It was found that the increase in polarity of the monomeric unit leads to an increase in both glass transition temperature and fragility, but only weakly affects the temperature dependence of chain motion and conductivity. This indicates that while interaction strength between segments is important on the lengthscale of structural dynamics, for chain motion and ionic transport such local factor is largely averaged out. It was also found that the temperature dependence of protein dynamics in glycerol-water solvent decouples from the viscosity similar to chain dynamics decoupling from segmental dynamics in polymers. This indicates that the same approach may be used to describe these phenomena.

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