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Effects of Temperature and Dissolved $LiClO_4$ on the Viscoelastic and Dynamic Properties of Poly(ethylene oxide), (PEO) Melts R.B. BOGOSLOVOV, J.C. SELSER, S. PENG, Department of Physics, University of Nevada, Las Vegas — Poly(ethylene oxide)/lithium perchlorate ($PEO/LiClO_4$) complexes are widely studied as a prototype solid polymer electrolyte in rechargeable lithium-polymer batteries. Characterizing the structure and dynamics of the system in its molten state is important for understanding the role of the polymer environment in lithium ion transport and conductivity. A fiber-optic coupled Fabry-Perot interferometer is employed in the investigation of the electrolyte viscoelastic and dynamic properties, which are both related to the intrachain local mobility and therefore to ion diffusion. The properties of the system are studied as a function of composition, temperature, and frequency. Structural relaxation processes are observed both in the neat polymer melt and in the salt containing electrolytes. A unique q-dependent measurement is performed, allowing the investigation of the Brillouin frequency and linewidth as a function of frequency. It revealed a double-step relaxation in the gigahertz frequency range. The two relaxations are identified as secondary relaxations with Maxwell-Debye character.

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