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Ion Conduction and Polymer Dynamics of Poly(2-vinylpyridine) - Lithium Perchlorate Mixtures[1] PORNPEN ATORNGITJAWAT, Burapha University, JAMES RUNT, Penn State University — Ion conduction and polymer dynamics of single phase mixtures of poly(2-vinylpyridine) (P2VPy) with 0.1 to 10 mol% lithium perchlorate ($LiClO_4$) were investigated using broadband dielectric spectroscopy. Interpretation of the relaxation behavior was assisted by findings from wide-angle and small-angle X-ray scattering experiments, and other techniques. Five dielectric relaxations were observed: a local β process in the glassy state, a segmental relaxation, a slow segmental process, an ion-mode relaxation, and electrode polarization. The local P2VPy relaxation was strongly suppressed with increasing $LiClO_4$ content arising from the formation of transient crosslinks, which lead to a subsequent decrease in the number of free pyridine groups, and/or a reduction in the local free volume in the presence of $LiClO_4$. Ion conduction at low $LiClO_4$ concentrations (< 10 mol%) is governed by the diffusion of anions through the matrix, which is strongly coupled with the segmental relaxation. At relatively high $LiClO_4$ concentration (10 mol%), partial decoupling between ion motion and the segmental relaxation was observed, leading to increased conductivity.

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