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Ionic Conductivity at the Ordinary-Extraordinary Transition in Polyelectrolyte Solutions RYAN MURPHY, MURUGAPPAN MUTHUKUMAR, Polymer Science and Engineering - UMass, Amherst — Experimental results on the individual contributions of the polyion, counterion, and added salt to the bulk conductivity of polyelectrolyte solutions will be presented. Concentration dependence of sodium polystyrenesulfonate (NaPSS) and potassium chloride (KCl) as the added salt was studied with respect to conductivity, viscosity, and dynamic light scattering (DLS) measurements. The bulk conductivity of NaPSS with KCl remains independent of polymer concentration up to the "ordinary-extraordinary" transition ($C_s/C_p \sim 1$), at which there is a split in the diffusion coefficient into slow and fast modes. As the polymer concentration increases ($C_s/C_p < 1$), there is a strong positive dependence of conductivity on polymer concentration. However, the severity of this positive dependence decreases with increasing salt concentration, thus pointing to a shift in the dominating conductive contribution from the counterions/added salt to the polyion chain at this transition region. With viscosity and diffusion coefficient measurements backing up conductivity data, it is the first time such a systematic experimental investigation has been done with regard to this issue.

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