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FTIR Investigation of Ion Environments in PEO-based "Single Ion" Polymer Conductors[1] MINGFU LU, JAMES RUNT, PAUL PAINTER — The infrared and Raman spectra of ionomers and electrolytes containing sulfonate groups have been previously studied in great depth. If the cation - anion interaction is relatively strong, the doubly degenerate asymmetric SO3- stretching mode becomes split into two components, while the symmetric SO3- stretching mode displays bands that can be assigned to the "free" (solvated) anion, neutral pairs and aggregates. In this paper we investigate a series of PEO-based polyester copolymer ionomers, with sulfonate anions covalently bound to the polymer chains, using FTIR spectroscopy. Ion content is systematically varied by changing the ratio of ionic to non-ionic isophthalate groups while keeping a fixed PEO segment molecular weight of 600. In the FTIR spectra of these ionomers, a splitting of the asymmetric mode is observed and only a single symmetric stretching band characteristic of some form of aggregated structure is apparent. There is no evidence that "free" or solvated ions are present. In addition, various ethylene oxide modes of vibration are shifted in frequency in a similar manner to those observed in studies of complexes of known structure, indicating their involvement in the formation of the aggregate.

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