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Understanding Ion Transport in Plasticized Polymer Electrolytes using Dielectric Spectroscopy U. HYEOK CHOI, SIWEI LIANG, JAMES RUNT, RALPH COLBY, Penn State University — A challenge facing the development of new renewable energy storage materials is the low ionic conductivity within polymer matrices. Most materials development must overcome two main hurdles: Increase the ionic mobility and maximize the conducting ion concentration. The main role of small molecule plasticizers is not only to improve flexibility and segmental motion, which consequently lowers the T_g and increase ion mobility, but also to solvate the counterion through some specific interaction, which increase the conducting ion content. In this study, we add plasticizers to polysiloxane-based ionomers that have anions covalently attached to the polymer chain, with Li^+ counterions. Using the 1953 Macdonald model it is possible to separate the conductivity of plasticized ionomers into the number density of conducting ions and their mobility, allowing us to quantify these vital quantities as functions of plasticizer content and temperature.

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