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Dynamic and Structure of Polymer-Cellulose Composite Electrolyte for Li-ion Battery PENGFEI ZHAN, JANNA MARANAS, The Pennsylvania State University — Crystalline PEO_6LiX complex is a tunnel-like polymer/salt structure that promotes fast Li motion. The application is limited because high ion conductivity is only observed with short molecular weight PEO, as the molecular weight increase, tunnels are misaligned and the conductivity is decreased. High aspect ratio nanofillers based on cellulose nanowhiskers are hypothesized to promote the formation of tunnel structures. Compared with unfilled electrolyte, the room temperature ion conductivity increased as much as 1100% in filled electrolyte. With wide angle x-ray scattering (WAXS), we observe that the structure transitions from amorphous phase to crystalline phase as we add cellulose nanowhiskers and this is because the interaction between cellulose surface and polymer chain enhances the crystallization. From the temperature dependence of conductivity, the calculated Li^+ hopping activation energy is shown to be lower in acidic cellulose nanowhisker filled samples. Our quasi-elastic neutron scattering (QENS) indicates with acidic surface, the rotation of PEO_6 channels are more stabilized and this could be the origin of the low activation energy and high conductivity

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