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Role of Succinonitrile in a Poly(ethylene oxide)/LiTFSI membrane for lithium batteries MAURICIO ECHEVERRI, THEIN KYU, Dept. of Polymer Engineering, University of Akron, Akron, Ohio — In designing novel flexible lithium battery membranes, high conductivity, peel strength and processability are the main targets for a successful product. Crystallinity of poly(ethylene oxide) (PEO) and lithium salts represent an obstacle to accomplish each of these specifications. We present a systematic study of ternary phase diagrams of PEO, bis(trifluoromethane) sulfonimide (LiTFSI) and succinonitrile (SCN) (i.e., solid plasticizer/co-solvent) mixtures by using DSC and polarized optical microscopy and map out various coexistence regions bound by the liquidus and solidus lines. The eutectic phase diagram of PEO/SCN system was calculated self-consistently using Flory-Huggins theory in conjunction with Landau-type phase field free energy for crystal solidification. Specific interactions such as hydrogen bonding were examined by FTIR. In lieu of PEO, poly(ethylene glycol) diacrylate (PEGDA) were used to completely eliminate all crystals. Further, photopolymerization of PEGDA affords a solid network containing LiTFSI and SCN that shows promising improvements with a conductivity value of 10^{-4} S/cm at 25 ° C.

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