Flexible solid polymer electrolyte membrane formed by photopolymerization JINWEI CAO, THEIN KYU, Univ of Akron — Binary and ternary phase diagrams of poly(ethylene glycol) dimethacrylate (PEGDMA), succinonitrile (SCN), and bis(trifluoromethane)sulfonimide (LiTFSI) blends have been established to provide guidance to fabrication of polymer electrolyte membrane (PEM). The phase diagram of binary PEGDMA/SCN mixture is of a typical eutectic type, whereas the binary PEGDMA/LiTFSI mixture reveals a eutectic trend exhibiting a wide single phase region at intermediate composition. Likewise, the ternary phase diagram of PEGDMA/SCN/LiTFSI mixture shows a wide isotropic region. The PEM network, formed by UV-crosslinking of PEGDMA in the isotropic region, is a solid amorphous network, but flexible and stretchable. Ion conductivity of PEM was measured as a function of temperature at different ratios of PEGDMA/SCN and SCN/LiTFSI. Of particular importance is that these PEM networks possess very high room-temperature ion conductivity on the order of $10^{-3}$ S cm$^{-1}$, which reaches the level of $10^{-2}$ S cm$^{-1}$ at elevated temperatures of 60-70 °C. The electrochemical stability of the solid PEM will be evaluated by cyclic voltammetry and its potential applicability in flexible lithium ion battery will be discussed.