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**Effects of plasticization on ionic conductivity enhancement of crosslinked polymer electrolyte membrane** RUIXUAN HE, THEIN KYU, University of Akron, DR. KYU'S TEAM — Glass transition temperatures (Tg) of solid polymer electrolyte membranes (PEM), comprised of polyethylene glycol diacrylate (PEGDA) prepolymer, lithium bis(trifluoromethanesulfonyl) imide (LiTFSI) salt, and succinonitrile (SCN) plasticizer, were systematically examined before and after crosslinking in the isotropic region guided by their ternary phase diagram. With increasing LiTFSI concentration, the Tg of uncured binary PEGDA/LiTFSI mixture increases drastically due to molecular complexation between lithium cation and ether oxygen, but ionic conductivity is very low (<10-6 S cm-1). Upon curing, this Tg increases and further reduces ionic conductivity. Upon adding SCN plasticizer, the Tg of PEM has significantly decreased to -60 oC and ionic conductivity also increased to the superionic conductor level of 10-3 S cm-1. The analysis of ionic conductivity vs. Tg behavior by Vogel-Tamman-Fulcher(VTF) equation revealed that this ionic conductivity enhancement is due to SCN plasticization resulting in lowering the network Tg as well as lowering the activation energy. Supported by NSF-DMR 1161070.

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