

## Effect of precise control of crosslink density on the thermal, mechanical and conductive properties of crosslinked ionene networks

Alexander Thome<sup>1</sup> and Kevin Miller<sup>1</sup>

1. Murray State University, Murray, Kentucky, United States

Ionenes are ion-containing polymers where the ionic group is anchored directly into the backbone of the repeating unit. Here, imidazolium groups were incorporated into a covalently crosslinked ionene framework using thiol-ene photopolymerization. The crosslink density was controlled using two synthetic variations: (a) the length of the alkenyl group on the original imidazolium-containing ene monomer and (b) the thiol:ene functional group ratio. In general, networks in which a stoichiometric thiol:ene functional group ratio was employed provided the highest glass transition temperatures and crosslink density, which resulted in the lowest anhydrous ionic conductivities. A combination of increasing the chain length of the ene monomer and a thiol:ene functional group ratio in which excess ene was utilized provided the highest ionic conductivities ( $\sim 10^{-6}$  S/m at 20 °C). Overall, this discussion will demonstrate that, with precise control of the network architecture, that the thermal, mechanical and conductive properties can be appropriately tuned.

