Intermediate-temperature proton conductivity of Li\textsuperscript{+}/H\textsuperscript{+} ion-exchanged material (Li,H)\textsubscript{3.5}Zn\textsubscript{0.25}GeO\textsubscript{4}

In this study, we demonstrate the development of novel proton conductors that are operative at intermediate temperatures, especially 300-400 °C, through the simple ion-exchange method. The Li\textsuperscript{+}/H\textsuperscript{+} ion-exchange was conducted for Li\textsubscript{14}Zn(GeO\textsubscript{4})\textsubscript{4} in non-aqueous solutions, and the chemical formula of the resultant sample was determined as Li\textsubscript{11.1}H\textsubscript{0.37}Zn\textsubscript{0.25}GeO\textsubscript{4}. This material exhibited relatively high electrical conductivity of 39.0 mS cm\textsuperscript{-1} and 5.5 mS cm\textsuperscript{-1} at 300 °C and 200 °C, respectively, in 10% H\textsubscript{2}O–90% N\textsubscript{2}. Furthermore, the main charge carrier in this electrolyte was identified as a proton from the H/D isotopic exchange study.