Supplementary Materials

Boosting the ionic conductivity of amorphous oxychloride solid electrolytes via different degrees of amorphization

Junquan Ou[1], Ishani Senevirathna[2], Vignyatha Tatagari[1], Adil Saleem[1], Carlo Segre[2], Leon Shaw[1,*]

[1]Department of Mechanical, Materials and Aerospace Engineering, Illinois Institute of Technology, Chicago, IL 60616, USA.
[2]Department of Physics, Illinois Institute of Technology, Chicago, IL 60616, USA.

*Correspondence to: Prof. Leon Shaw, Department of Mechanical, Materials and Aerospace Engineering, Armour College of Engineering, 10 W. 32nd Street, Chicago, IL 60616, USA. E-mail: lshaw2@iit.edu
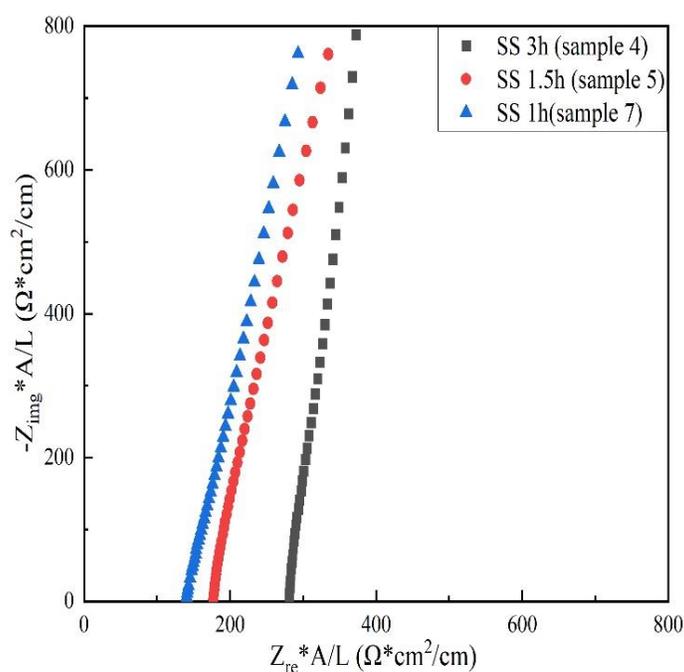

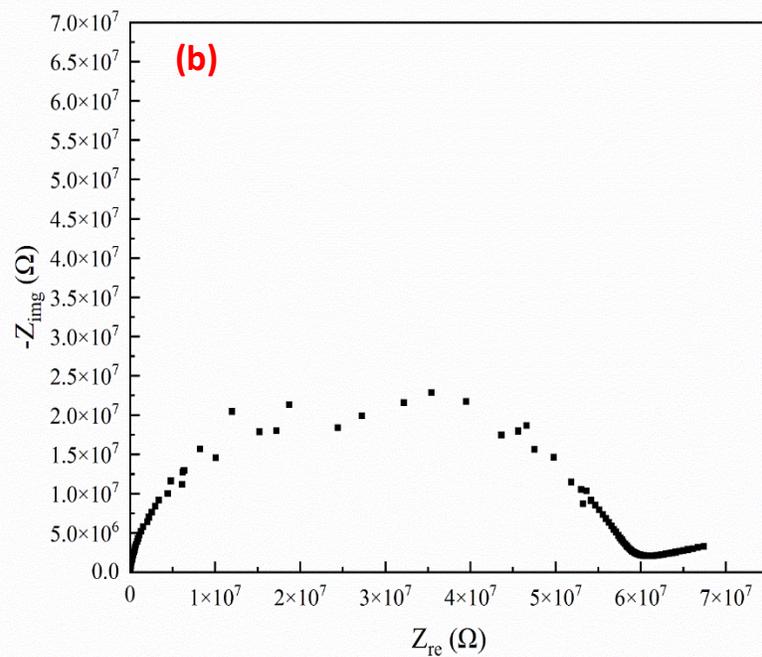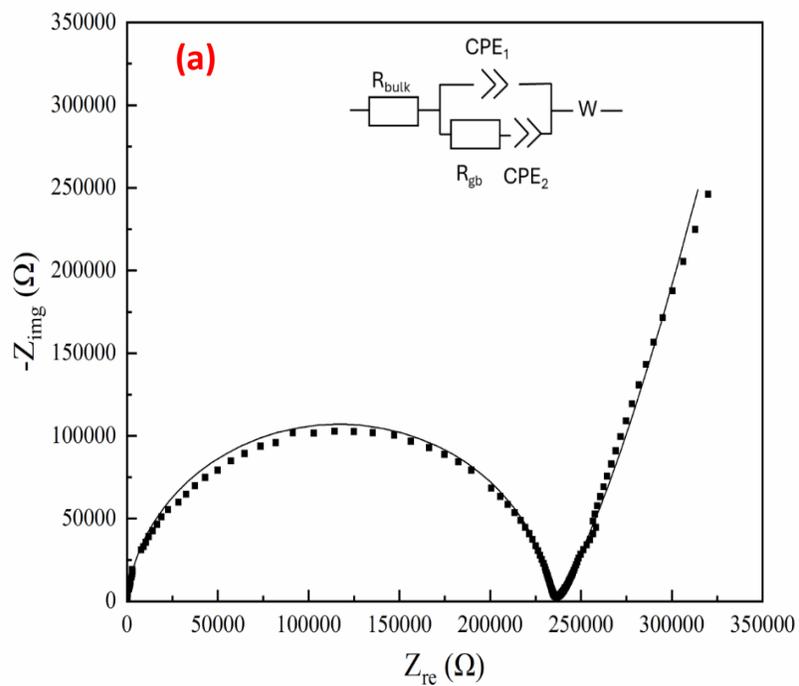**Figure S1.** EIS curves of samples 4, 5 and 7 at RT.

Figure S2. Nyquist plots of the crystalline LiCl pellet: (a) at 100°C and (b) at RT. The insert shows the equivalent circuit used for curve fitting.
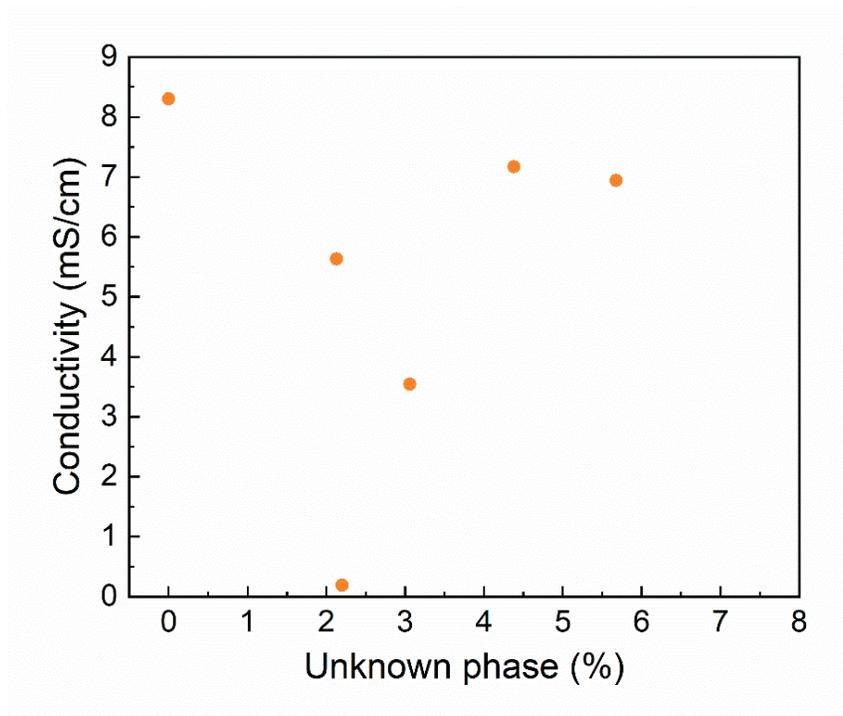
Figure S3. The total conductivity of LOTC samples as a function of the quantity of crystalline unknown phase. No clear trend is observed.
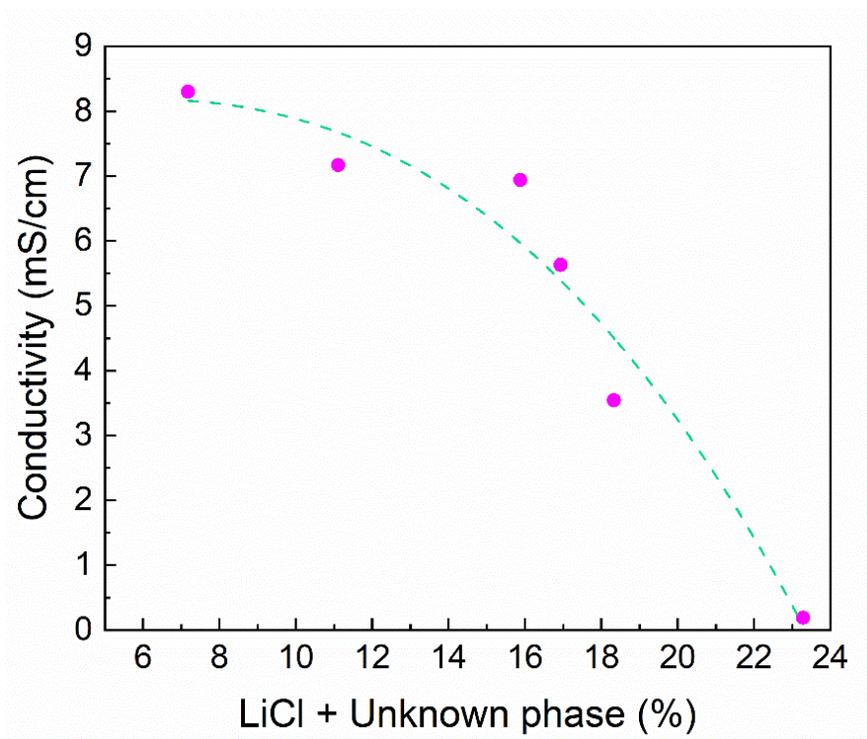

Figure S4. The total conductivity of LOTC samples as a function of the total quantity of crystalline LiCl + unknown phases.
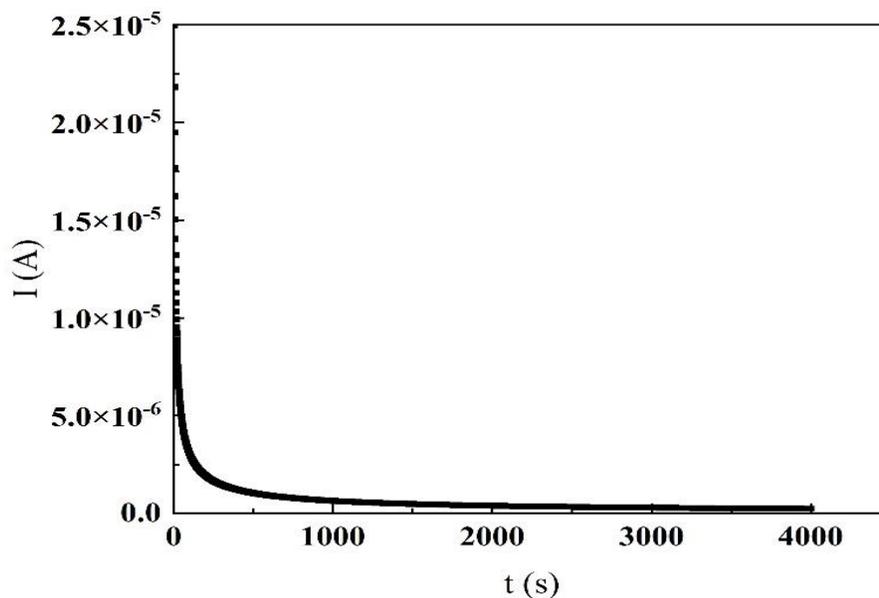
Figure S5. DC polarization curve of sample 1 at RT. The electronic conductivity is found to be 1.81×10^{-9} S/cm which is 6 orders of magnitude lower than its electrical conductivity.
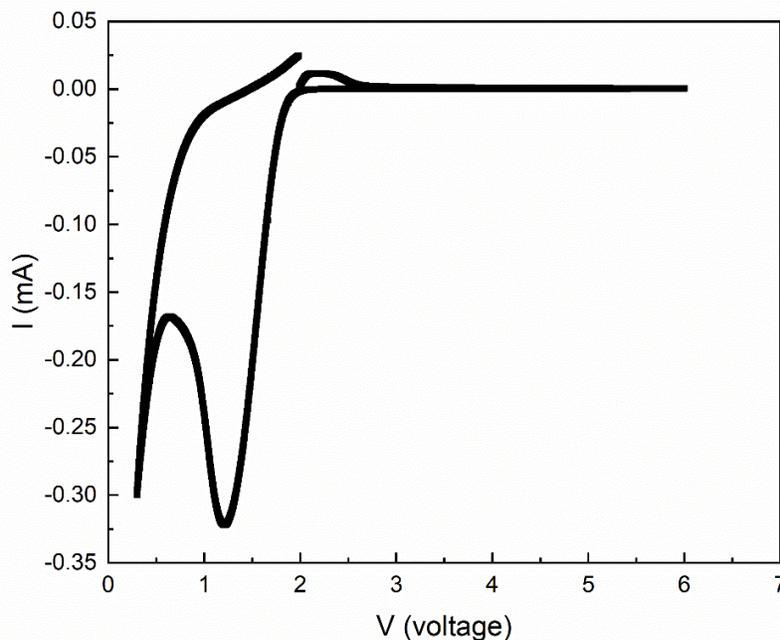

Figure S6. The CV curve of LOTC with the CV scan starting at the open circuit voltage (OCV = 1.99 V vs. Li$^+$/Li).
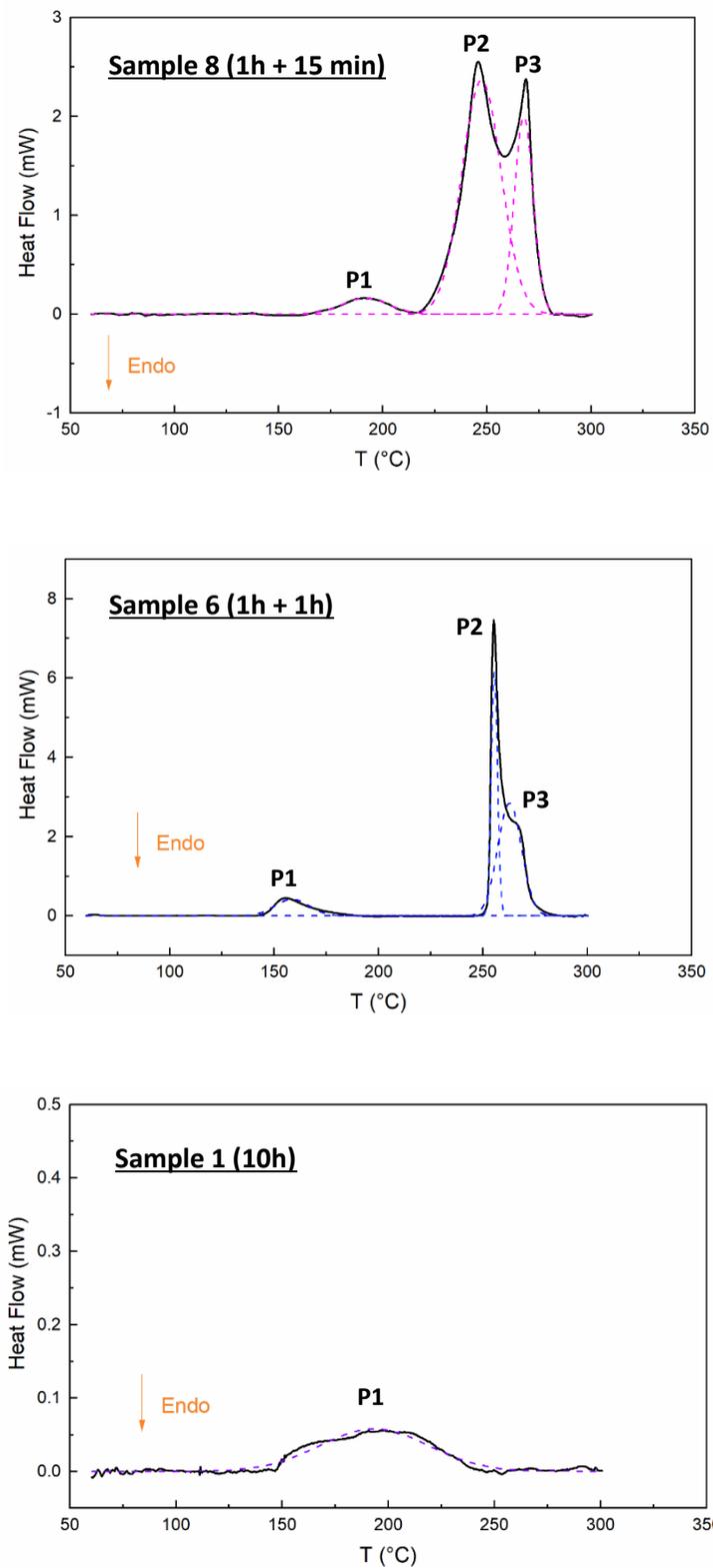
Figure S7: DSC curves of samples 8, 6 and 1, as indicated. The dashed lines are from curve fitting.
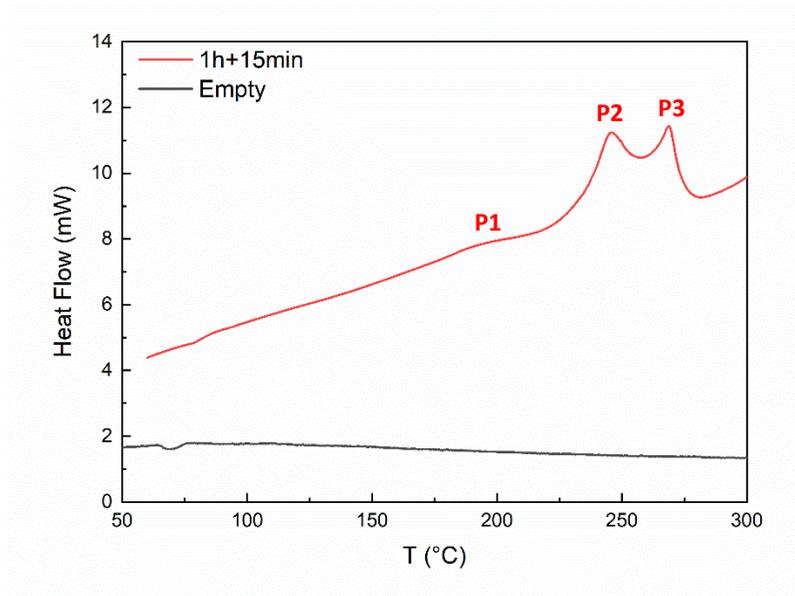
Figure S8: DSC curve of an empty crucible in comparison with that of 1h+15min sample (i.e., sample 8). Note that the empty crucible has a baseline with a slight negative slope as temperature increases. However, 1h+15min sample has a positive baseline, suggesting gradual release of some stored energy in the heating process plus three exothermic peaks (P1, P2 and P3).