Supplementary Material: Elastic modulus, hardness, and fracture toughness of $Li_{6.4}La_3Zr_{1.4}Ta_{0.6}O_{12}$ solid electrolyte

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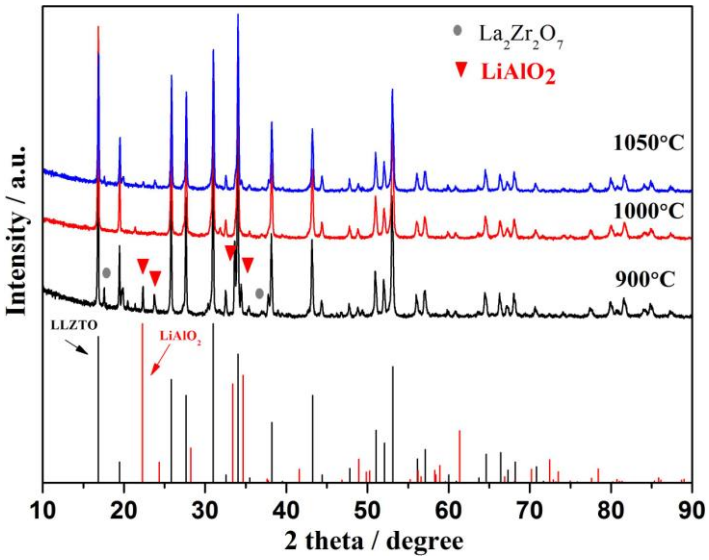

FIG. S1: XRD patterns of LLZTO composites synthesized at different annealing temperatures for 12h.

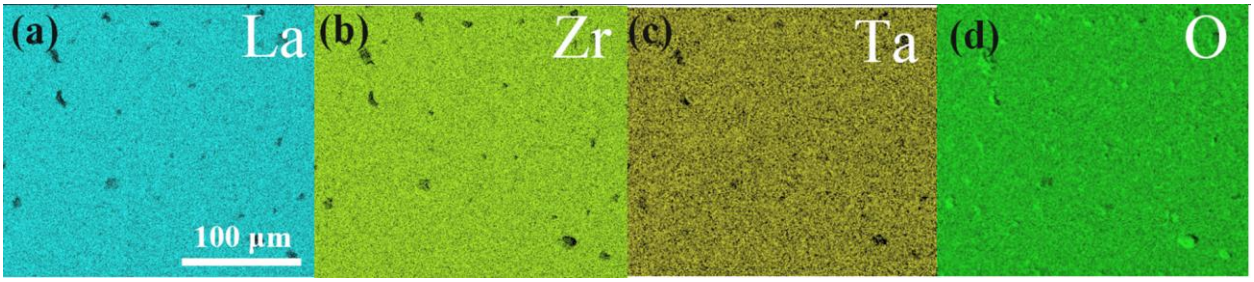

FIG. S2: The EDX mapping showing the elemental distributions of (a) La, (b) Zr, (c) Ta, and (d) O.

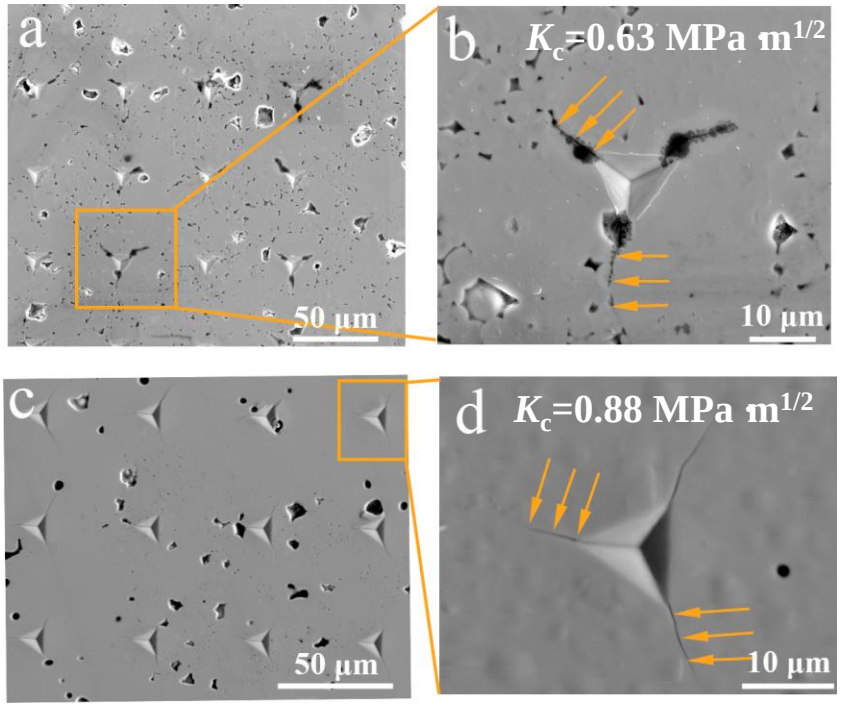

FIG. S3: Crack length determined by the SEM images. (a)-(b) show the indents and the crack length for LLZTO of the relative density of 83%, and (c)-(d) show the SEM images for the LLZTO sample of 94% density. The fracture toughness K_c is calculated using the crack length determined by the SEM images, (b) K_c=0.63 MPa m$^{1/2}$, and (d) K_c=0.88 0.63 MPa m$^{1/2}$.