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Electronic Supplementary information (ESI)

Tetragonal vs. cubic phase stability in Al – free Ta doped Li₇La₃Zr₂O₁₂ (LLZO)

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Figure S1: Representative Raman spectra for each Ta composition used to generate the averaged spectra shown in Figure 3 of the manuscript.

As seen in Figure S1, the Raman spectra for the tetragonal and the critically doped Ta = 0.5 compositions are nearly identical where there is a difference in the two spectra shown for the subcritically doped composition. This variability is what is shown in the Raman figure in the manuscript (Figure 3). The black region surrounding the central line (manuscript Fig. 3) is the uncertainty in the intensity. Since there is

little uncertainty (i.e. black region) for the tetragonal and critically doped (Ta=0.5) compositions, this suggests that the microstructure is homogeneous. This is in contrast to the subcritically doped composition where there is considerable uncertainty, suggesting an inhomogeneous microstructure.