

Origin of intergranular Li metal propagation in garnet-based solid electrolyte by direct electronic structure analysis and performance improvement by bandgap engineering

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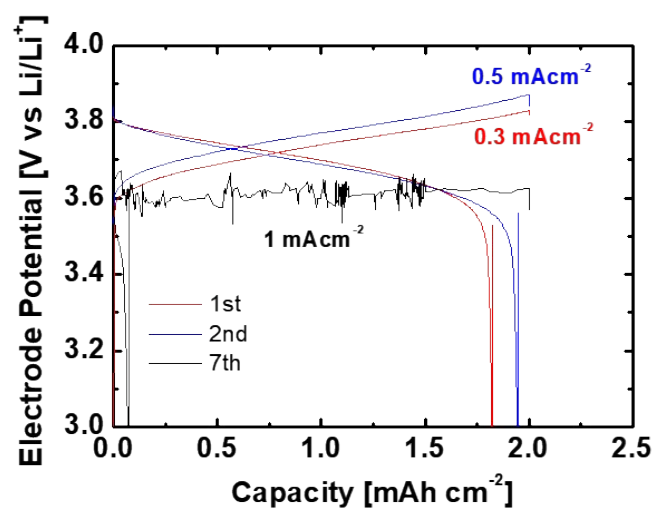


Figure S1. Galvanostatic voltage profiles of the hybrid electrolyte NCM-Li full cell with polished (pristine) LLZTO.

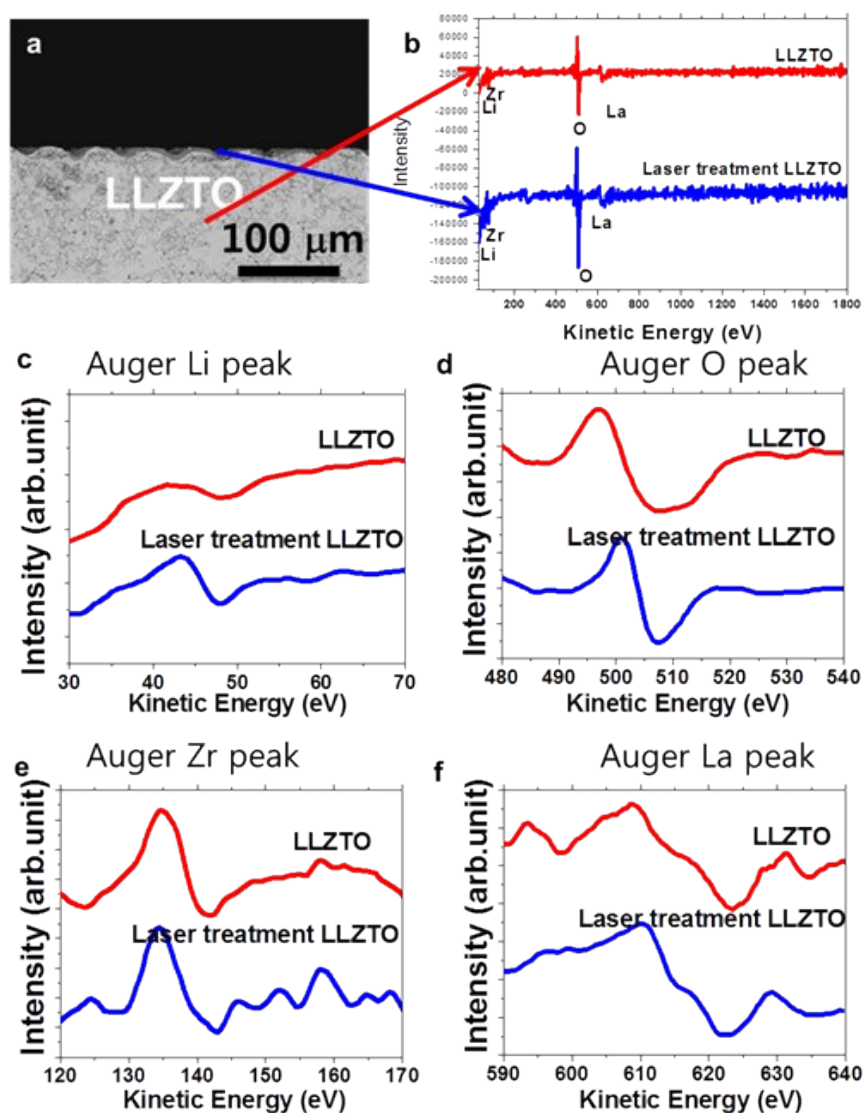


Figure S2. (a) Cross-sectional SEM image of laser-treated LLZTO. (b) Auger spectra of pristine and laser-treated LLZTO regions. (c) Li, (d) O, (e) Zr and (f) La Auger peaks acquired on pristine and laser-treated LLZTO regions.

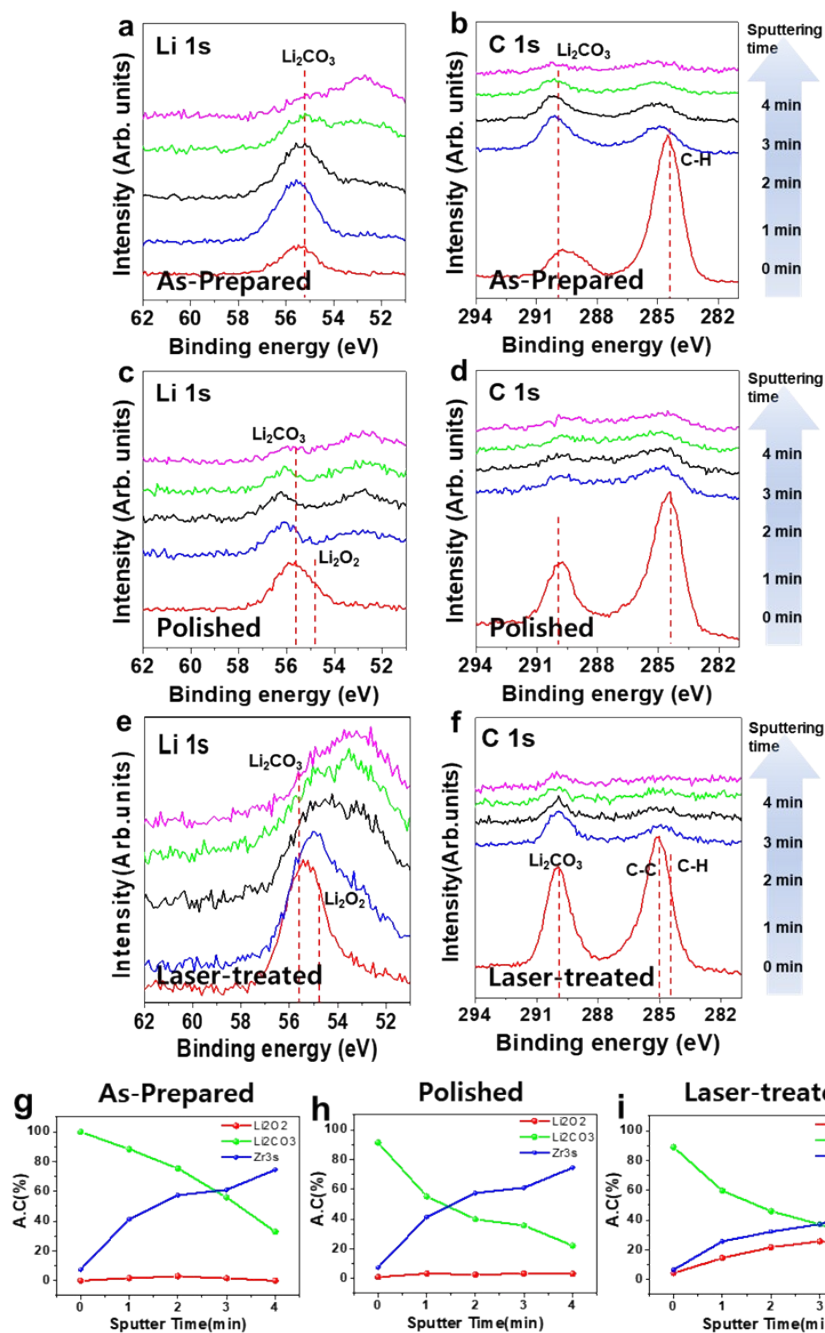


Figure S3. XPS Depth profiles for as-prepared, polished, and laser-treated LLZTO samples. (a) Li 1s and (b) C 1s peaks of as-prepared LLZTO sample. (c) Li 1s and (d) C 1s peaks of polished LLZTO sample. (e) Li 1s and (f) C 1s peaks of laser-treated LLZTO sample. (g)-(i) Atomic concentrations of Li_2O_2 , Li_2CO_3 , Zr3s phases for (g) as-prepared, (h) polished, and (i) laser-treated LLZTO samples.

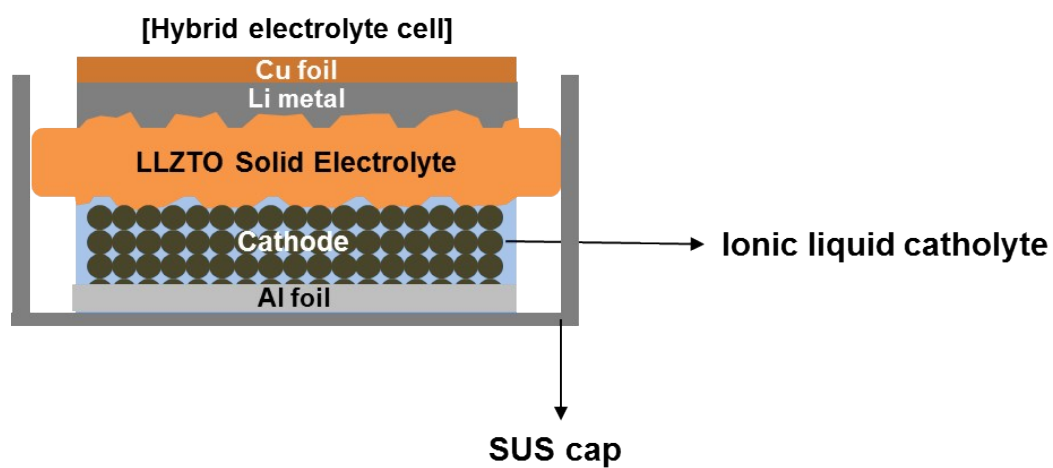


Figure S4. Schematic diagram of hybrid electrolyte cell. (SUS cap, Cu and Al foils obtained from Wellcos Corp.)

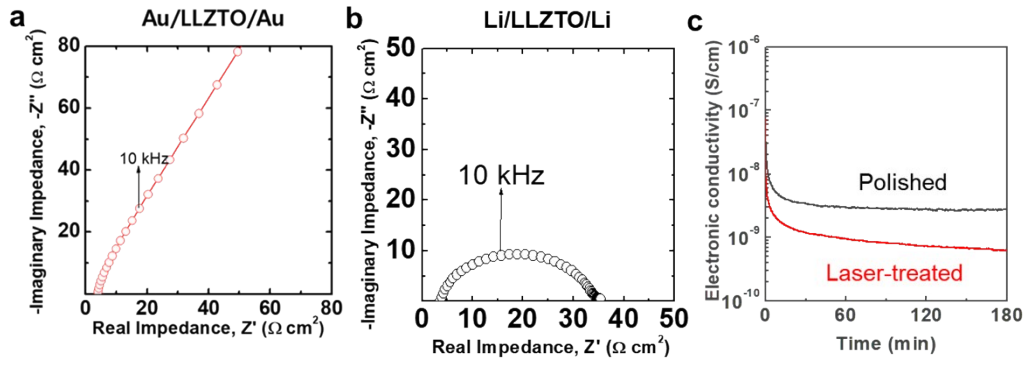


Figure S5. (a), (b) AC-impedance spectra acquired from (a) Au/LLZTO/Au and (b) Li/LLZTO/Li cells. (c) Electronic conductivity results for the polished and the laser-treated LLZTO samples.

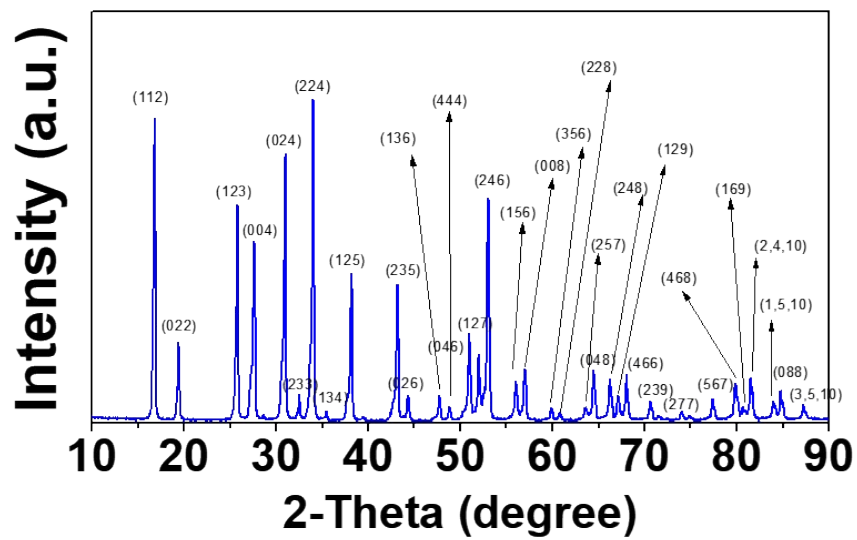


Figure S6. XRD data for LLZTO sample.