

SUPPORTING INFORMATION

Three-Dimensional, Solid-State Mixed Electron-Ion Conductive Framework for Lithium Metal Anode

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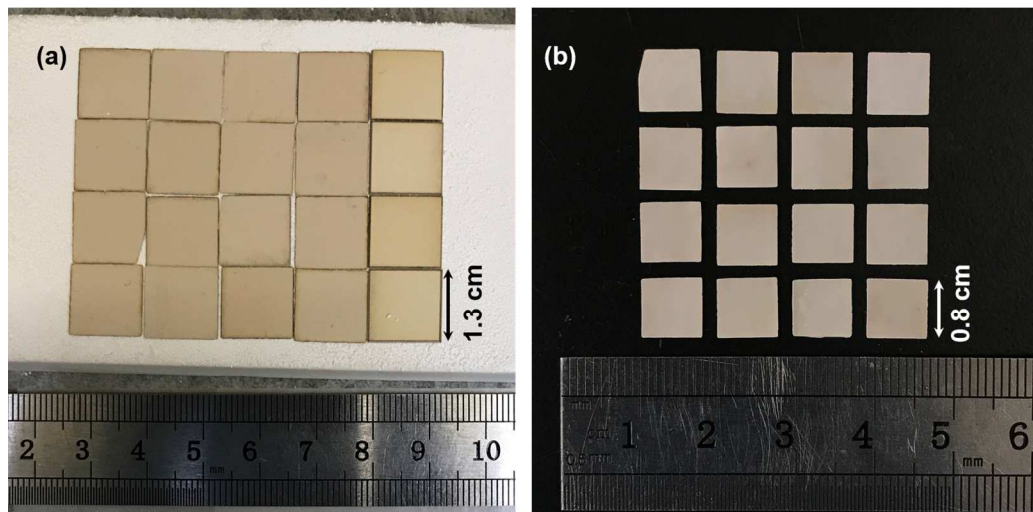


Figure S1. Photos of (a) laminated tapes before sintering and (b) trilayer garnet after sintering. The size reduction after sintering is 37%.

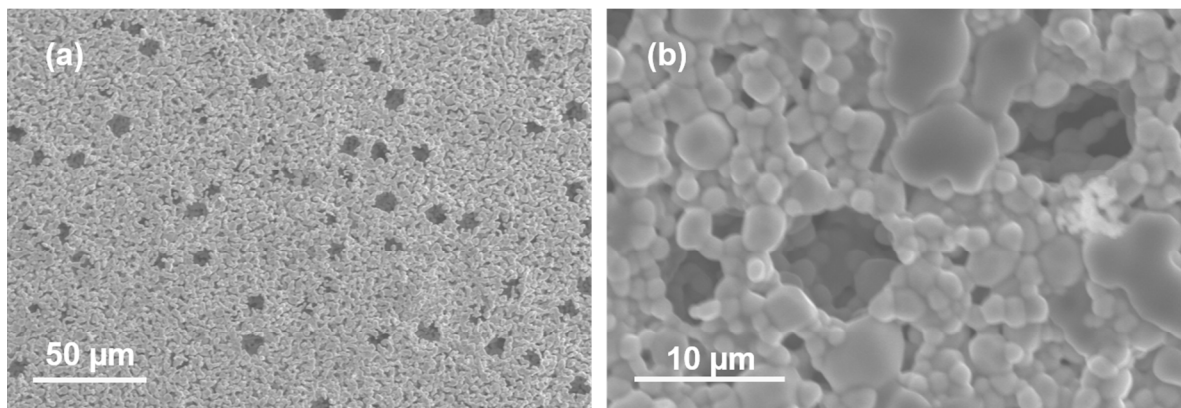


Figure S2. (a) SEM image of porous garnet structure showing various pore sizes. (b) Zoom-in SEM image depicting big $\sim 10\ \mu\text{m}$ pores and smaller $\sim 1\ \mu\text{m}$ pores.

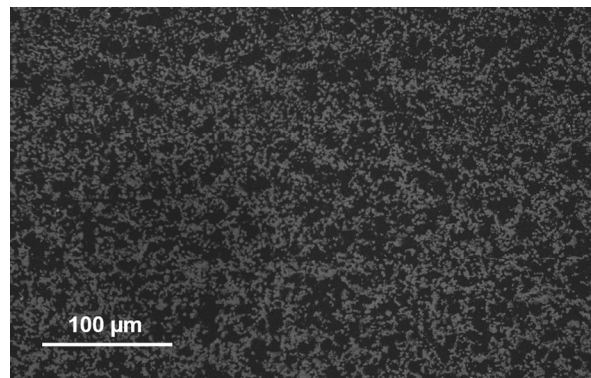


Figure S3. Back-scattering SEM image of the porous layer showing the high porosity of 66%.

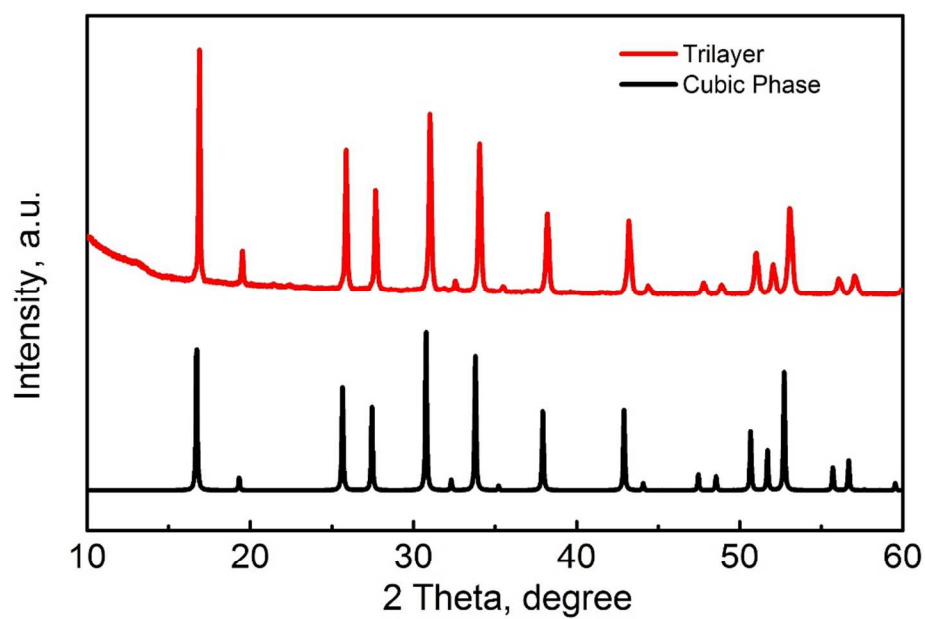


Figure S4. XRD of trilayer garnet showing consistency with cubic garnet phase.

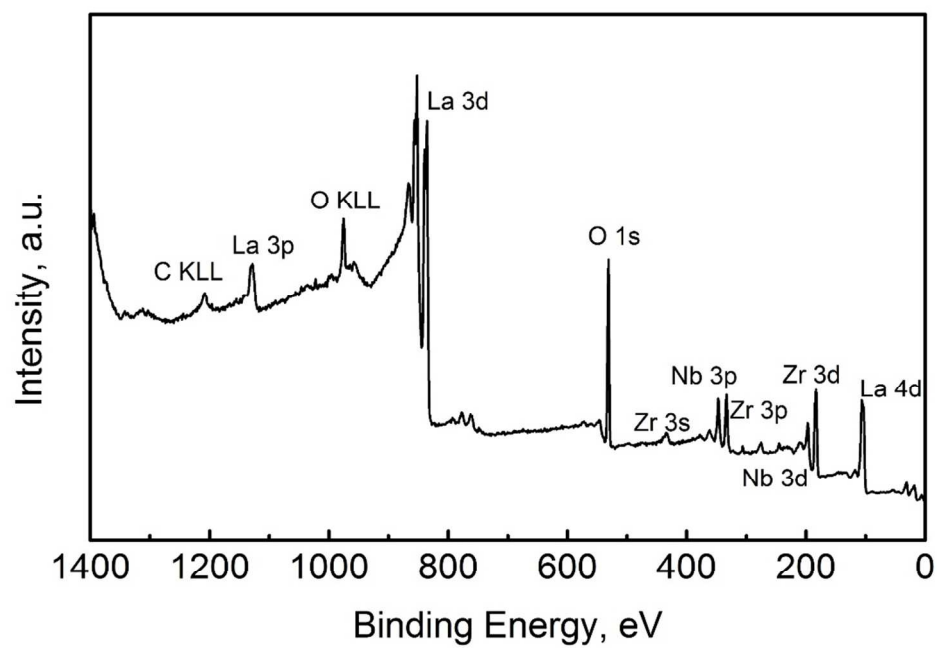


Figure S5. XPS of trilayer garnet showing LLZN chemical composition.

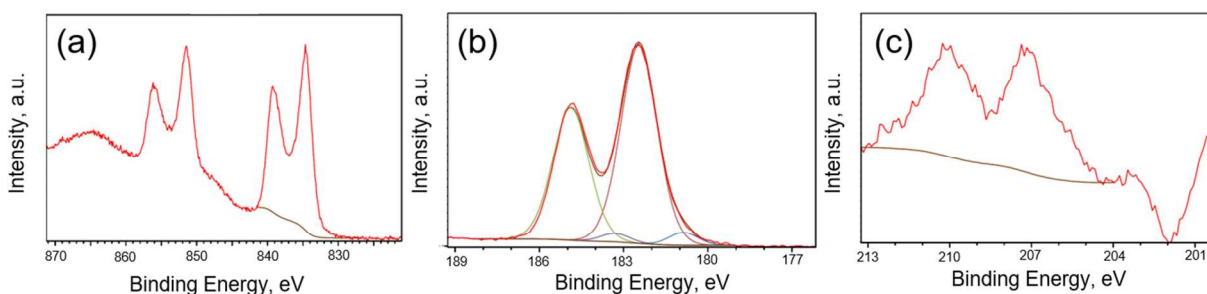


Figure S6. Detailed XPS scan of La (a), Zr (b) and Nb (c) indicating the characteristic peaks of cubic phase garnet.

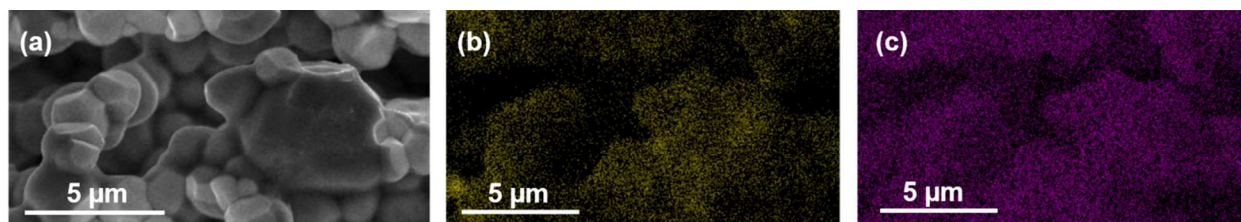


Figure S7. Elemental mapping of porous garnet with CNT coating. (a) SEM image of the CNT coated porous garnet layer depicting micrometer size pores. (b-c) Elemental mapping of C (b) and La (c) of the CNT coated porous garnet.

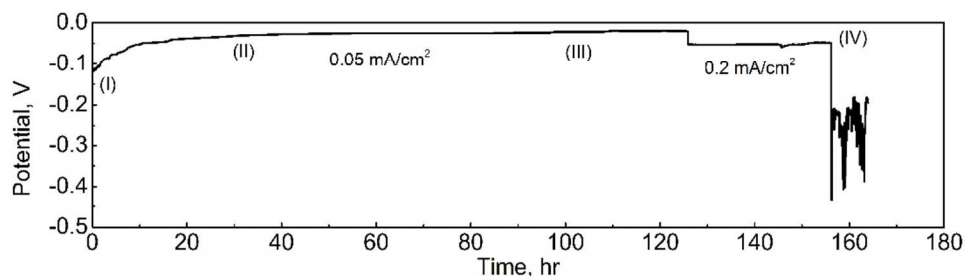


Figure S8. The voltage profile of the electrochemical deposition of lithium into the 3D-MCF.

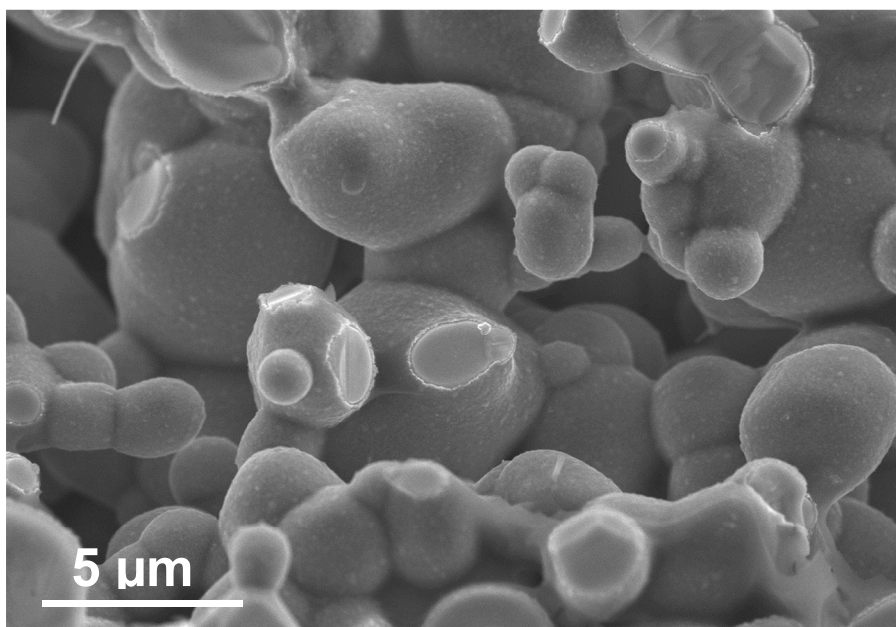


Figure S9. SEM image of 3D-MCF before lithium plating.

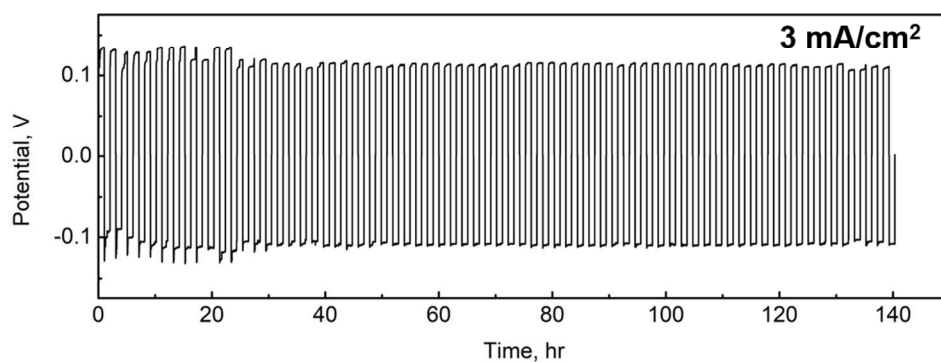


Figure S10. Voltage profile of Li metal cycling with 3D-MCF architecture. The current density is 3 mA/cm^2 and the capacity limit is 3 mAh/cm^2 . The cell can be stably cycled for over 140 hours with no short circuit, which demonstrates the advantage of low resistance and long cycle life of the 3D-MCF design.