

Electronic Supplementary Information

**In-situ interferometry study of ionic mass
transfer phenomenon during the
electrodeposition and dissolution of Li metal in
solvate ionic liquids**

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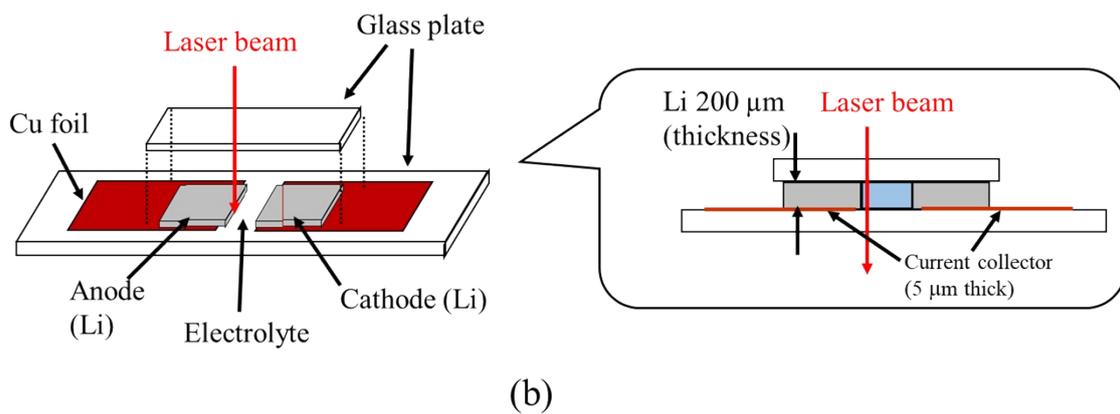
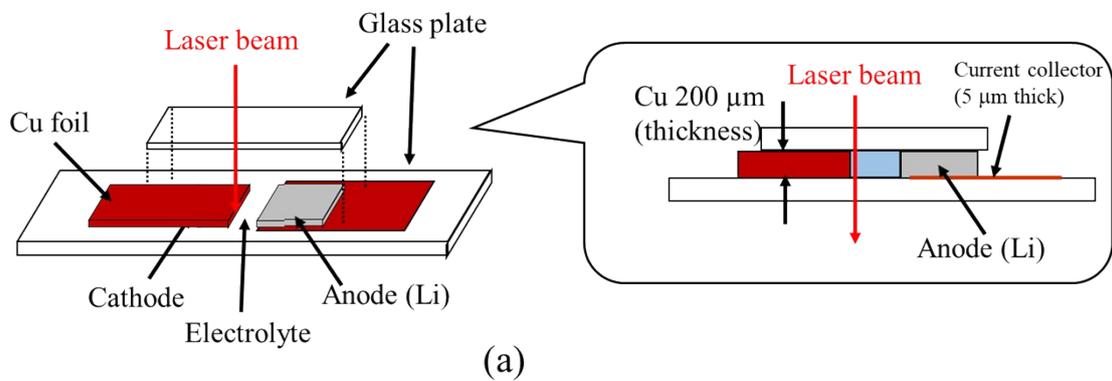


Figure S1. Schematic diagram of an electrochemical cell (a) for the electrodeposition of Li metal, (b) for electrochemical dissolution of Li metal.

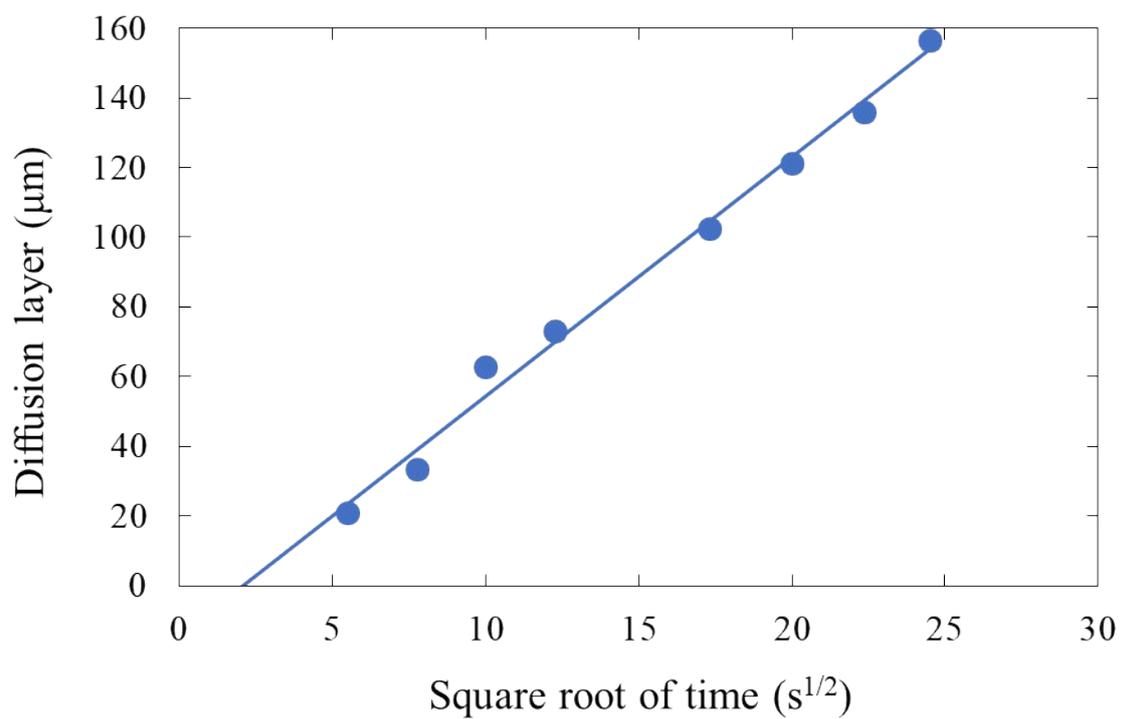


Figure S2. Development of a diffusion layer thickness accompanying the electrodeposition of Li metal in the cathode over anode configuration. The diffusion layer thickness was determined by optical absorbance measurements.

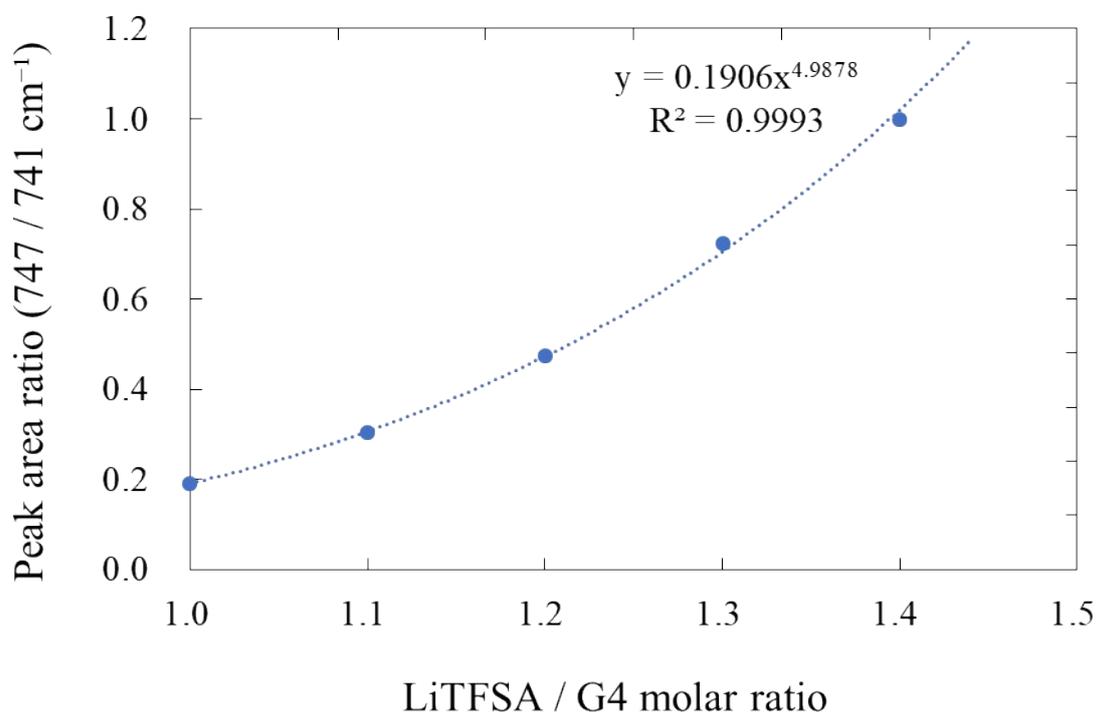


Figure S3. Ratio of the integrated Raman peak intensity at 741 and 747 cm⁻¹ in each concentration electrolyte shown in Figure 3a.

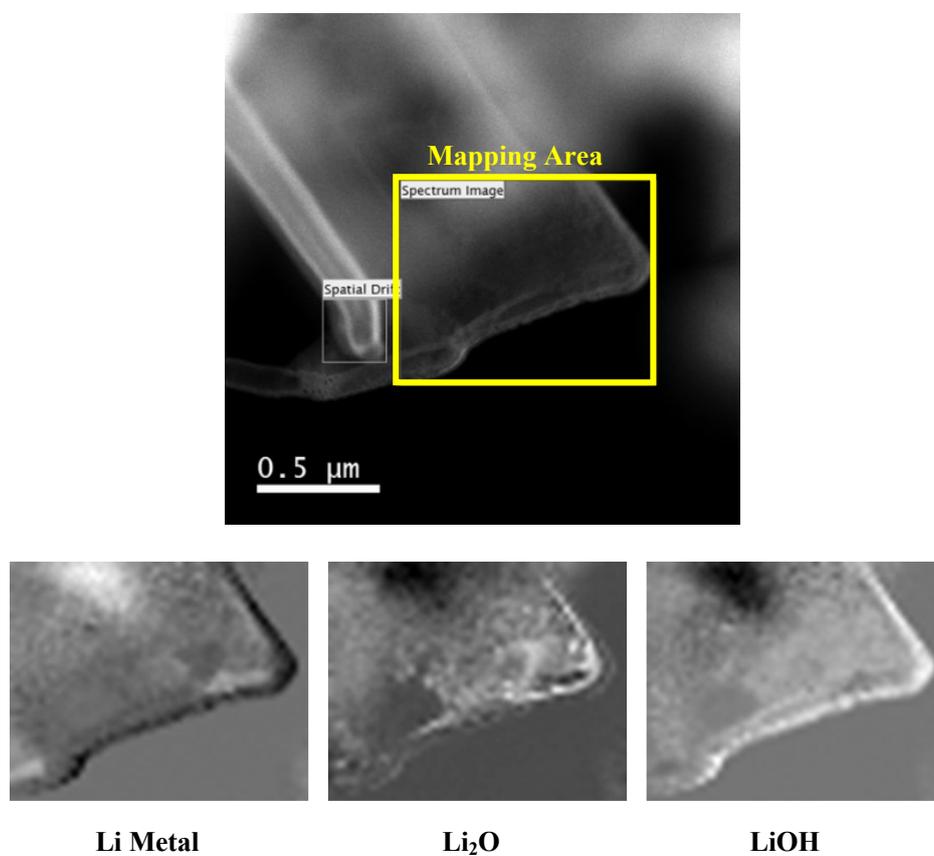


Figure S4. STEM image and chemical composition mapping images based on EELS spectra.

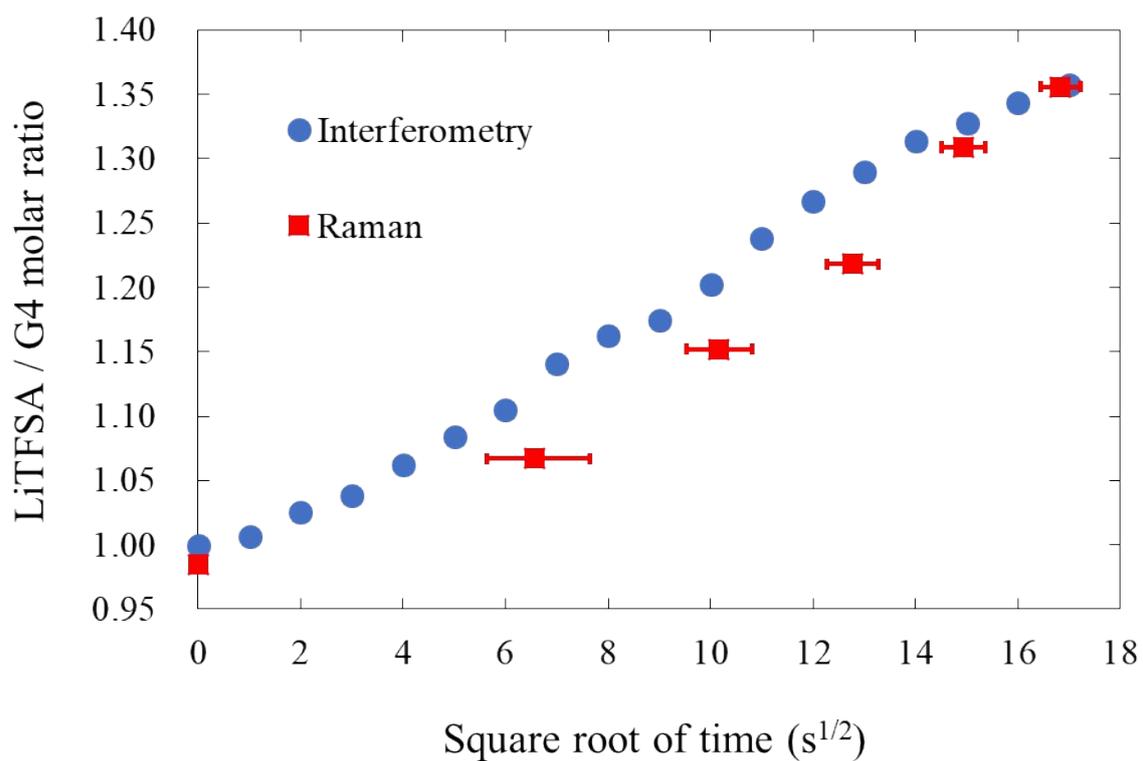


Figure S5. Molar ratio of LiTFSA and G4 at the anode surface as a function of the square root of time by (blue circles) the interferometry technique and (red square) Raman spectroscopy. Error bars related to measuring the accumulation time of 25 s and the plots show the intermediate time for Raman spectroscopy.