

Investigation of the reaction mechanism of lithium sulfur battery in different electrolyte system by in situ Raman spectroscopy and in situ X-ray diffraction

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Supplementary Material

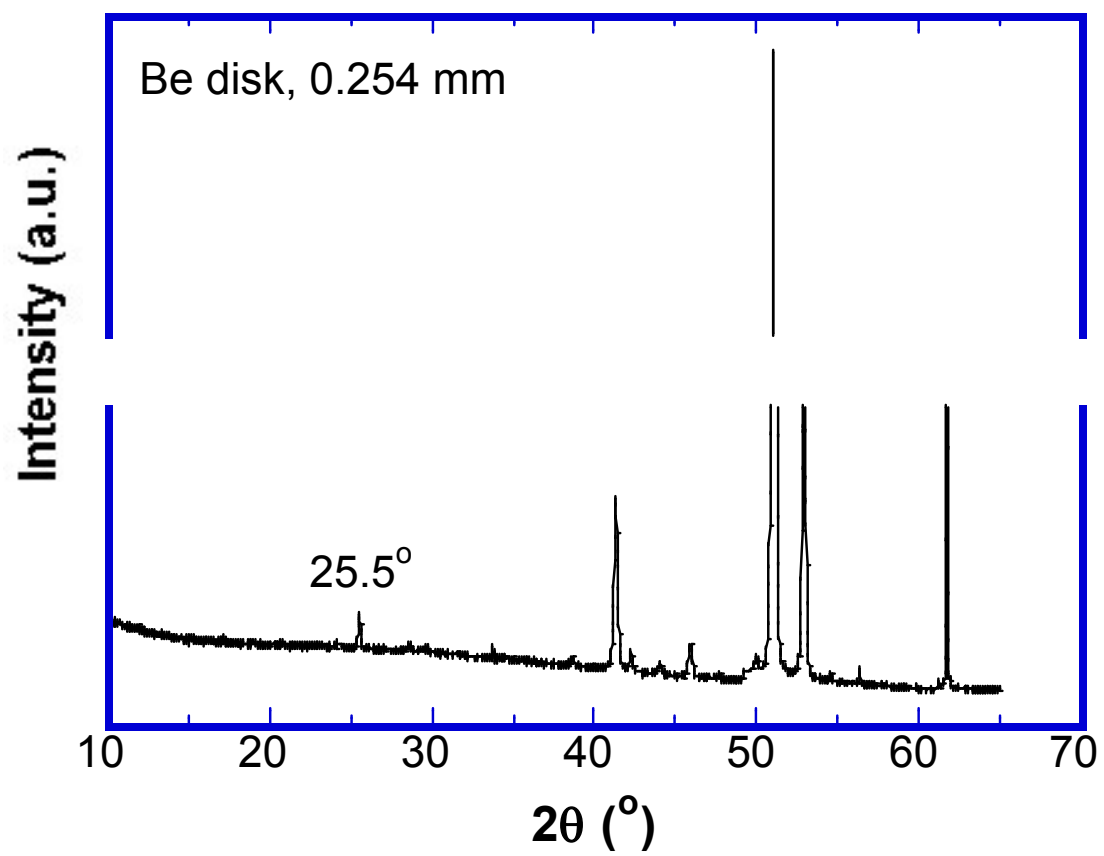


Figure S1 XRD spectrum of beryllium disk used in the in situ XRD cell.

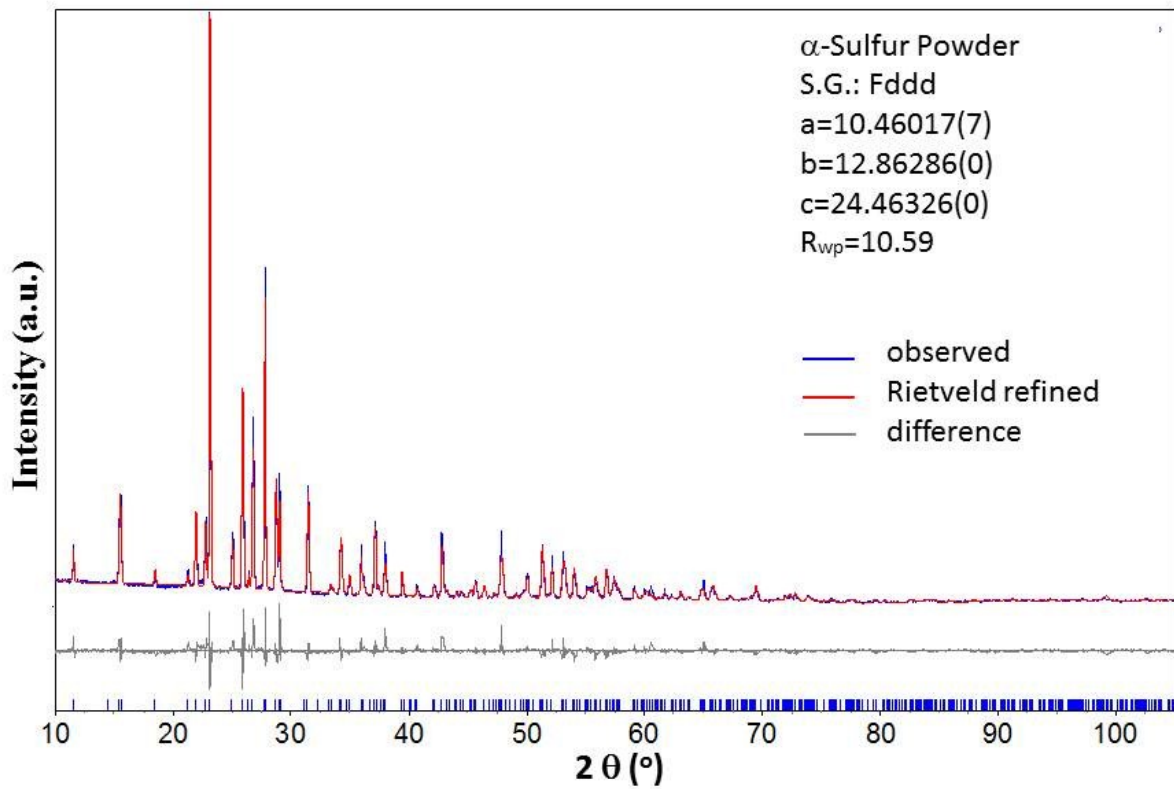


Figure S2 *XRD diffraction pattern of α -sulfur powder and the lattice parameters obtained from Rietveld refinement.*

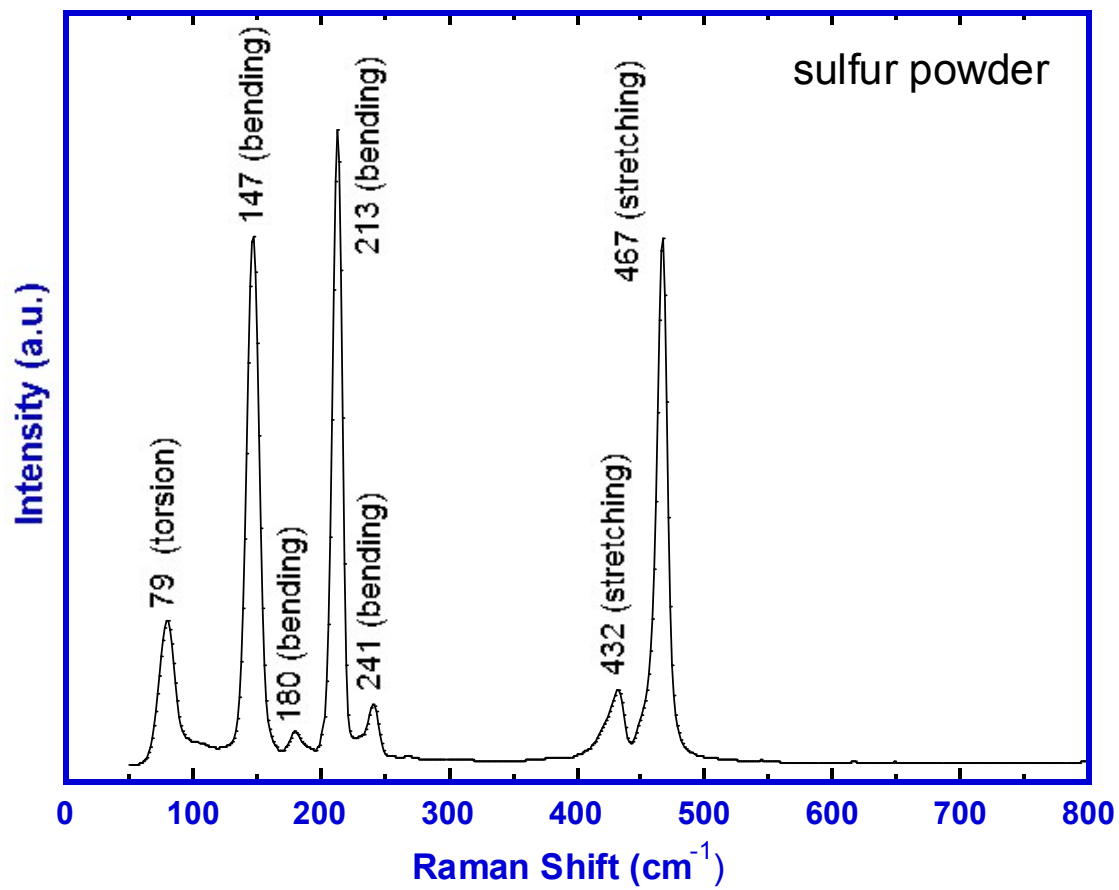


Figure S3 *Raman spectrum of the sulfur powder and the band assignments.*

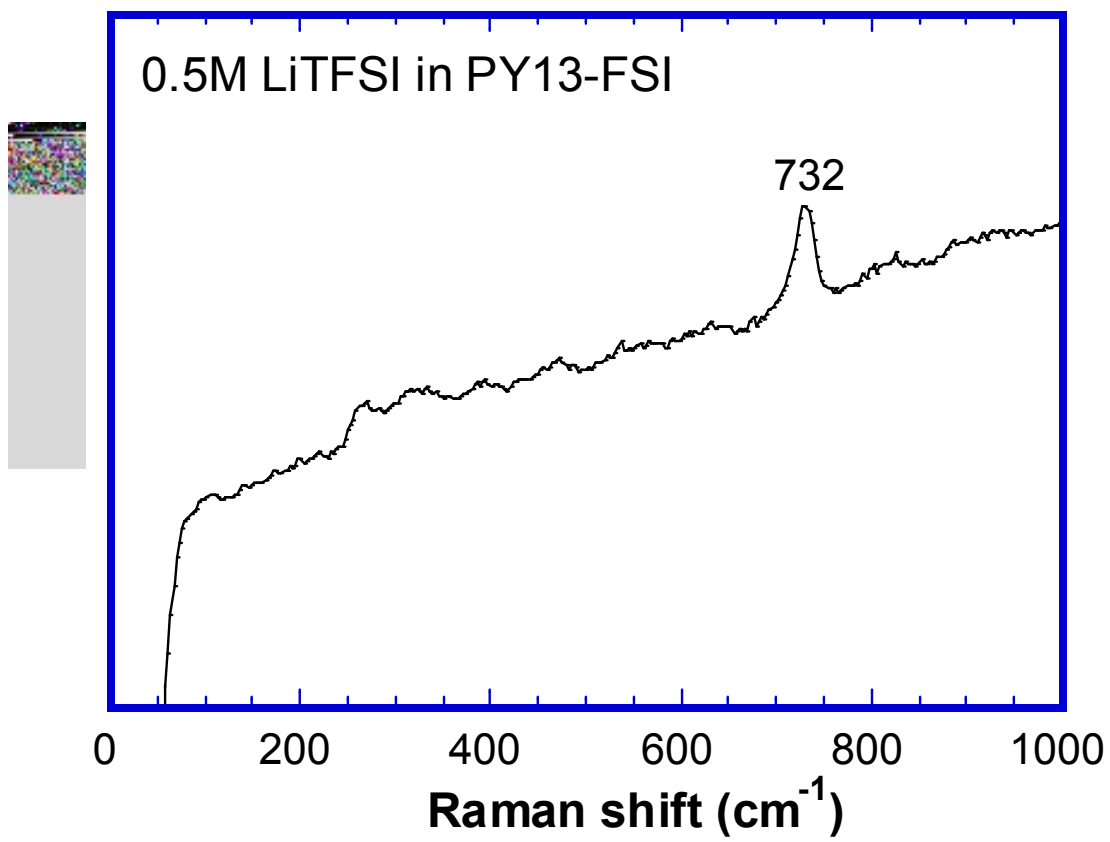


Figure S4 Raman spectrum collected from 0.5mol L^{-1} LiTFSI in $\text{PY}_{13}\text{-FSI}$.

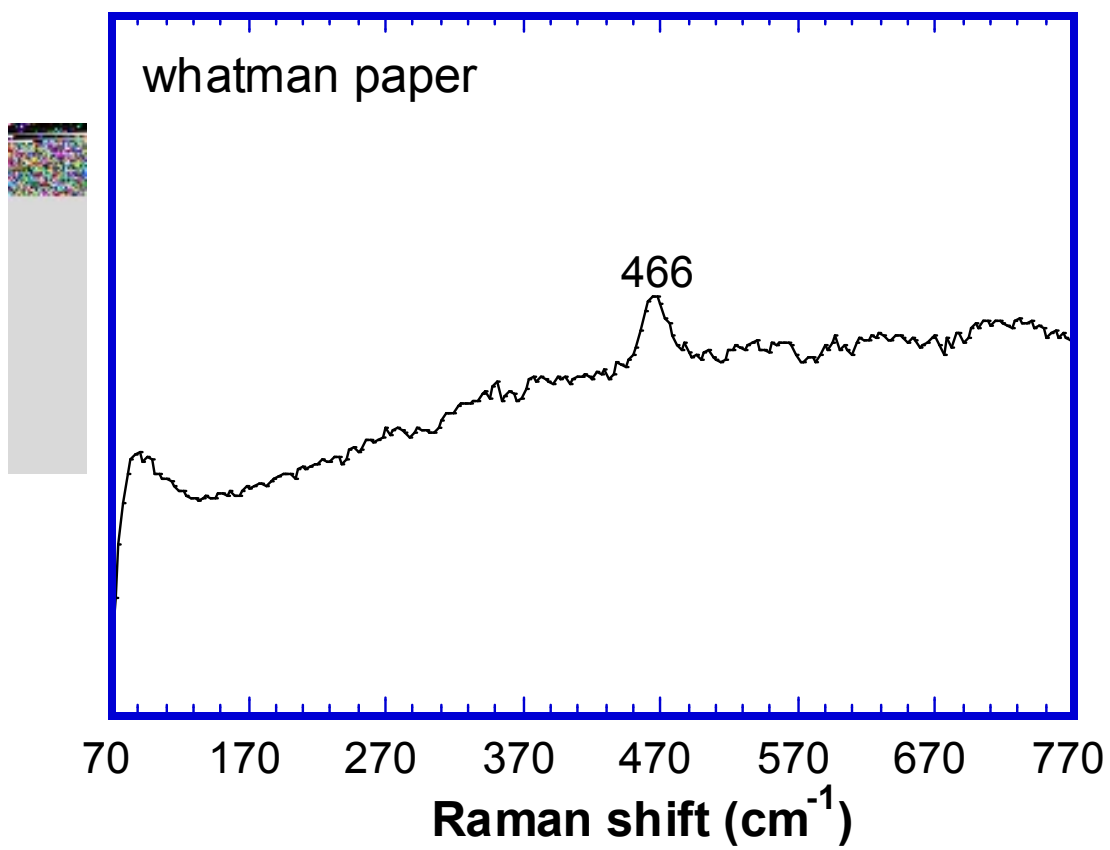


Figure S5 *Raman spectrum of Whatman filter showing a band at 466 cm⁻¹.*

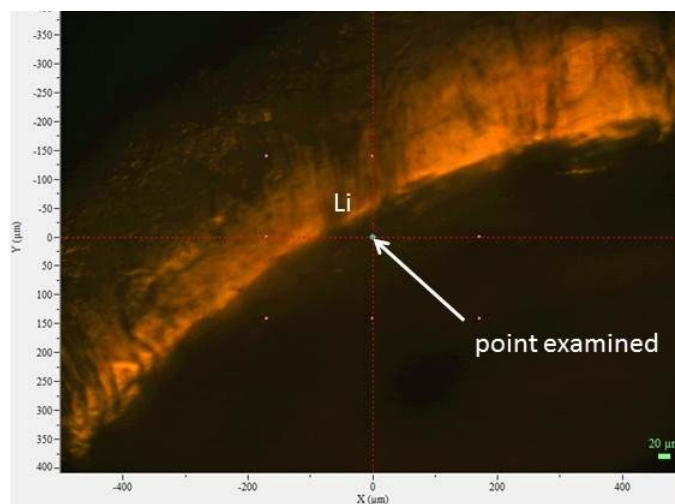


Figure S6 *Optical microscope image showing the lithium anode and the area examined with Raman spectroscopy.*

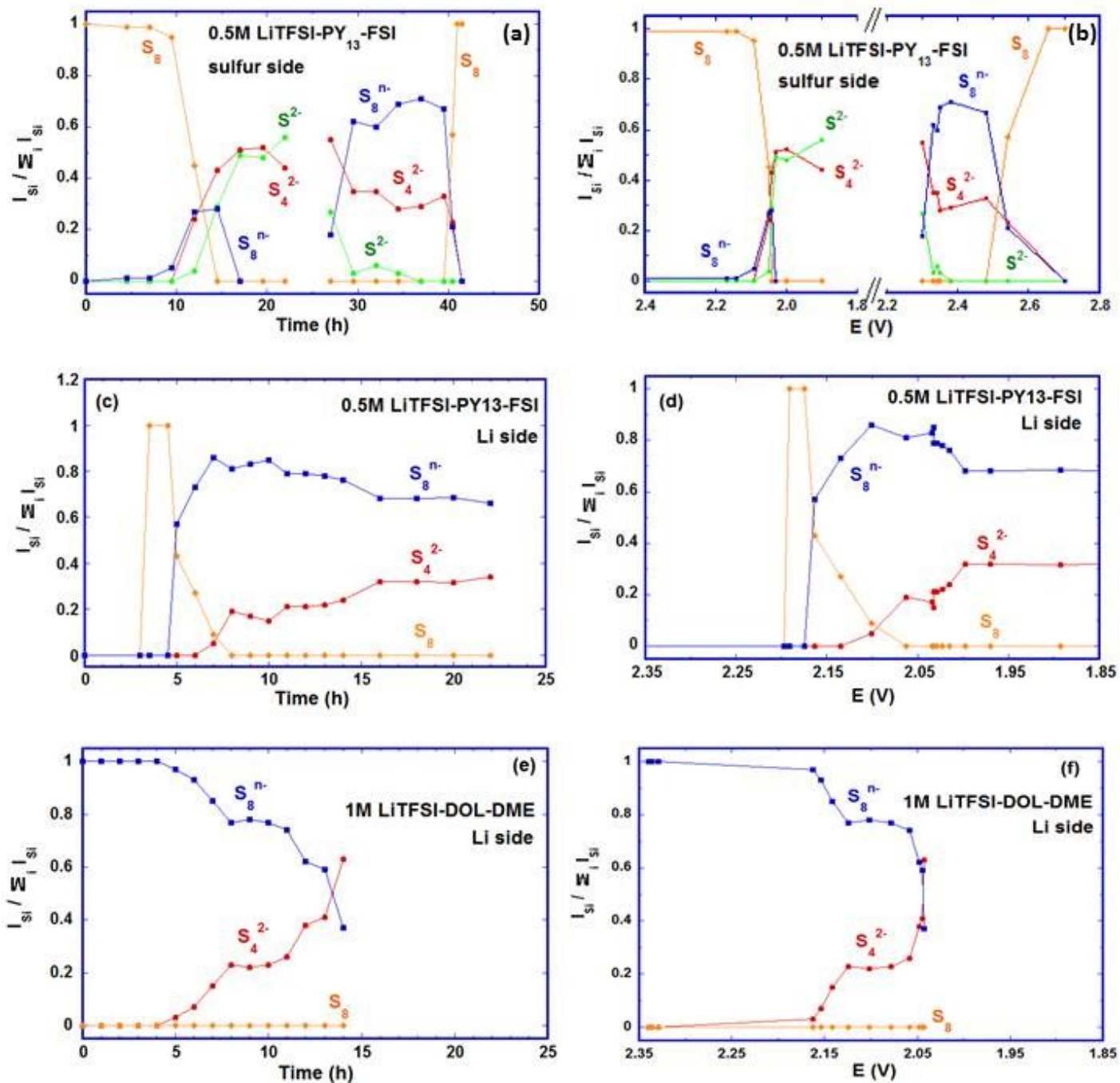


Figure S7 Variation of intensity ratios of different sulfur related species as a function of time and electric potential of cells with two types of electrolytes.

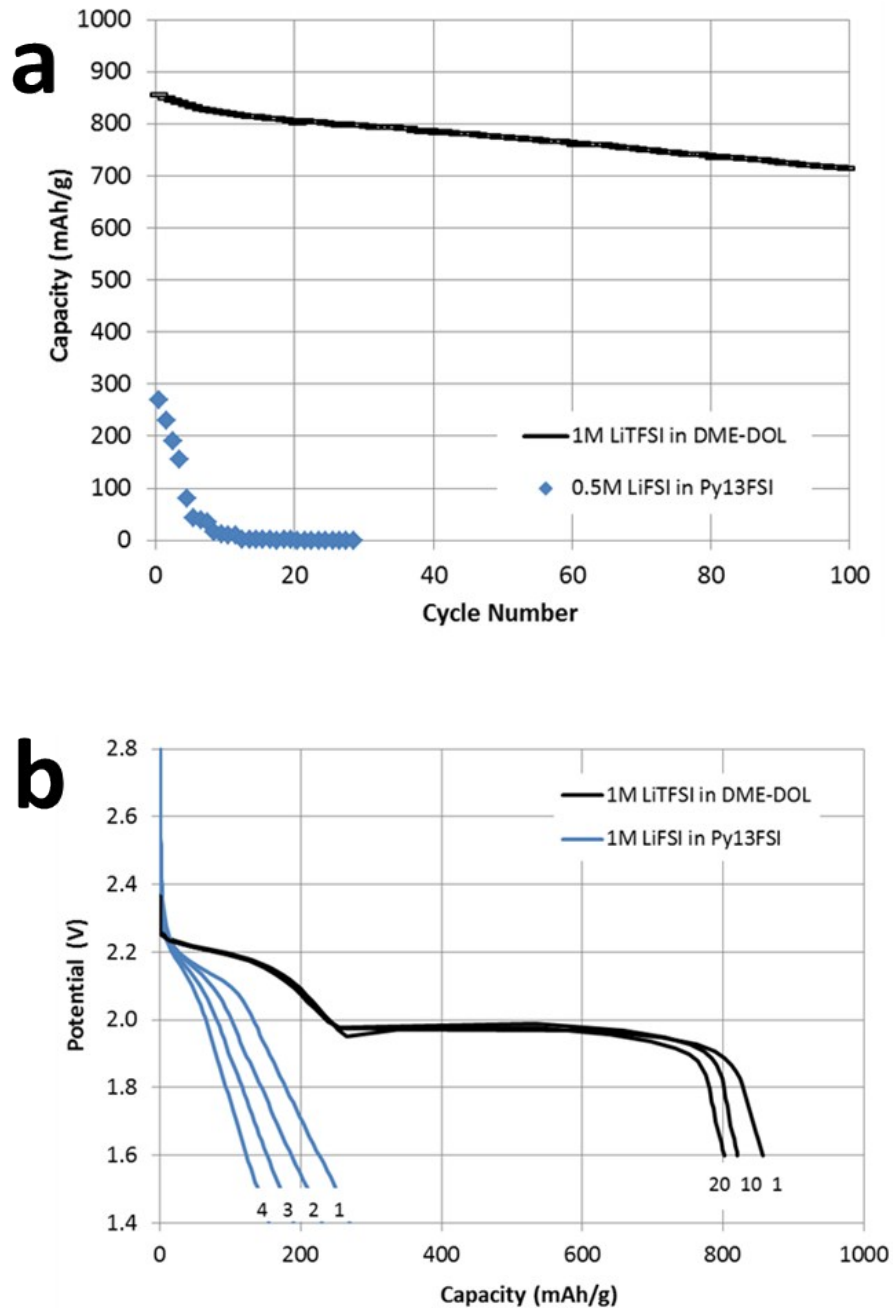


Figure S8 (a) Capacity vs. cycle number ; electrolyte: (1) 1 mol L⁻¹ LiTFSI in DOL-DME; charged at C/5, discharged at C/2; (2) 0.5 mol L⁻¹ LiFSI in PY₁₃-FSI, C/10.

(b) Potential vs. Capacity; electrolyte: (1) LiTFSI in DOL-DME, , charged at C/5, discharged at C/2; (2) 1 mol L⁻¹ LiFSI in PY₁₃-FSI and 1 mol L⁻¹ , C/10.