

Supporting information

Dynamic structural changes at LiMn_2O_4 /electrolyte interface during lithium battery reaction

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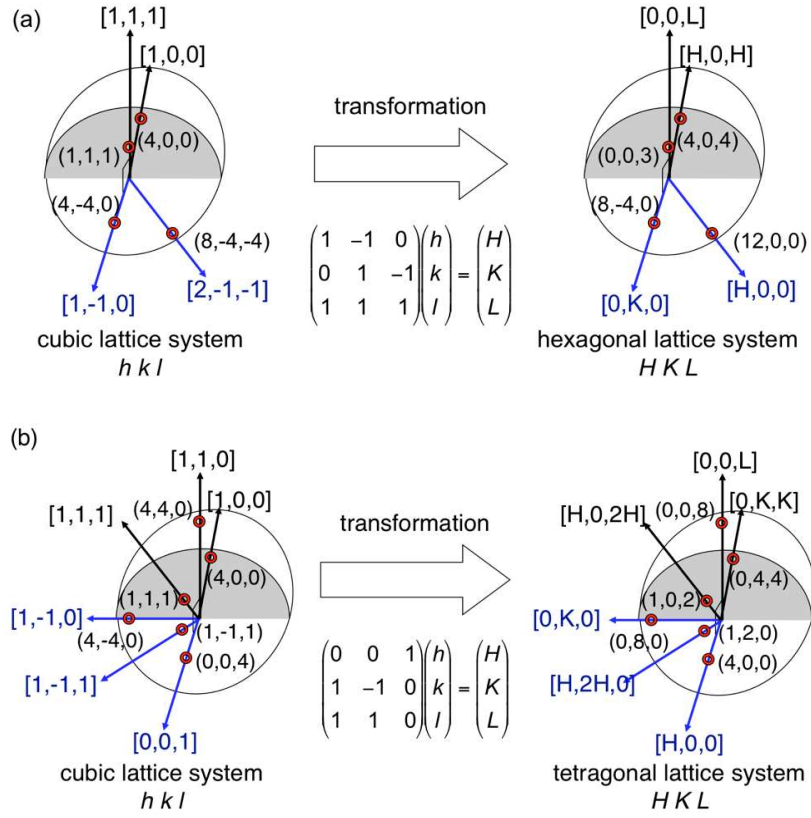


Figure S1: Reciprocal lattice space models of the transformation from the cubic system to the hexagonal lattice of (a) the LiMn_2O_4 (111) film and (b) the tetragonal lattice of LiMn_2O_4 (110) film.

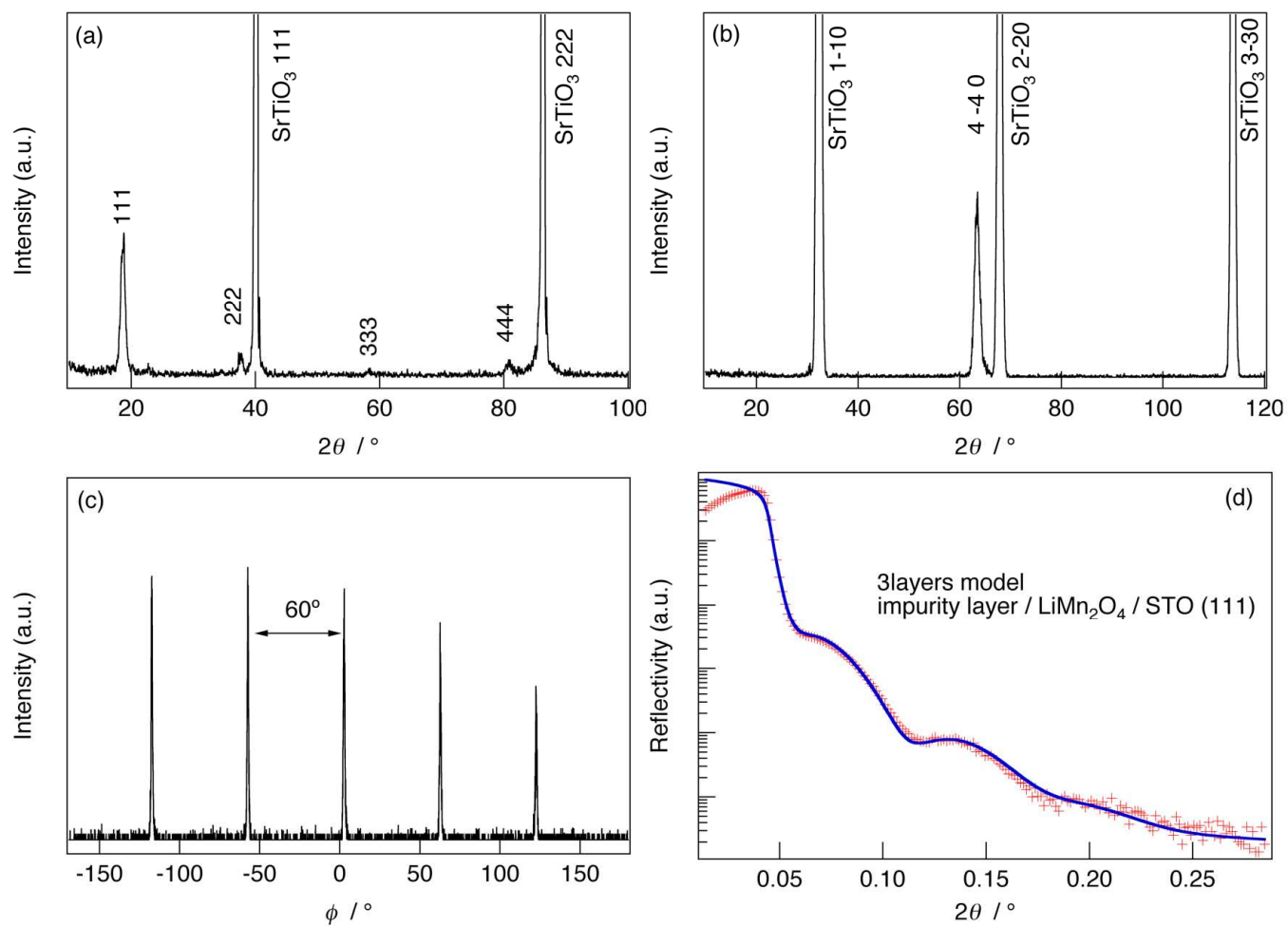


Figure S2 (a–c) XRD patterns and (d) XRR and fitting curves of epitaxial LiMn_2O_4 (111) thin film used for *in situ* XRD measurements.

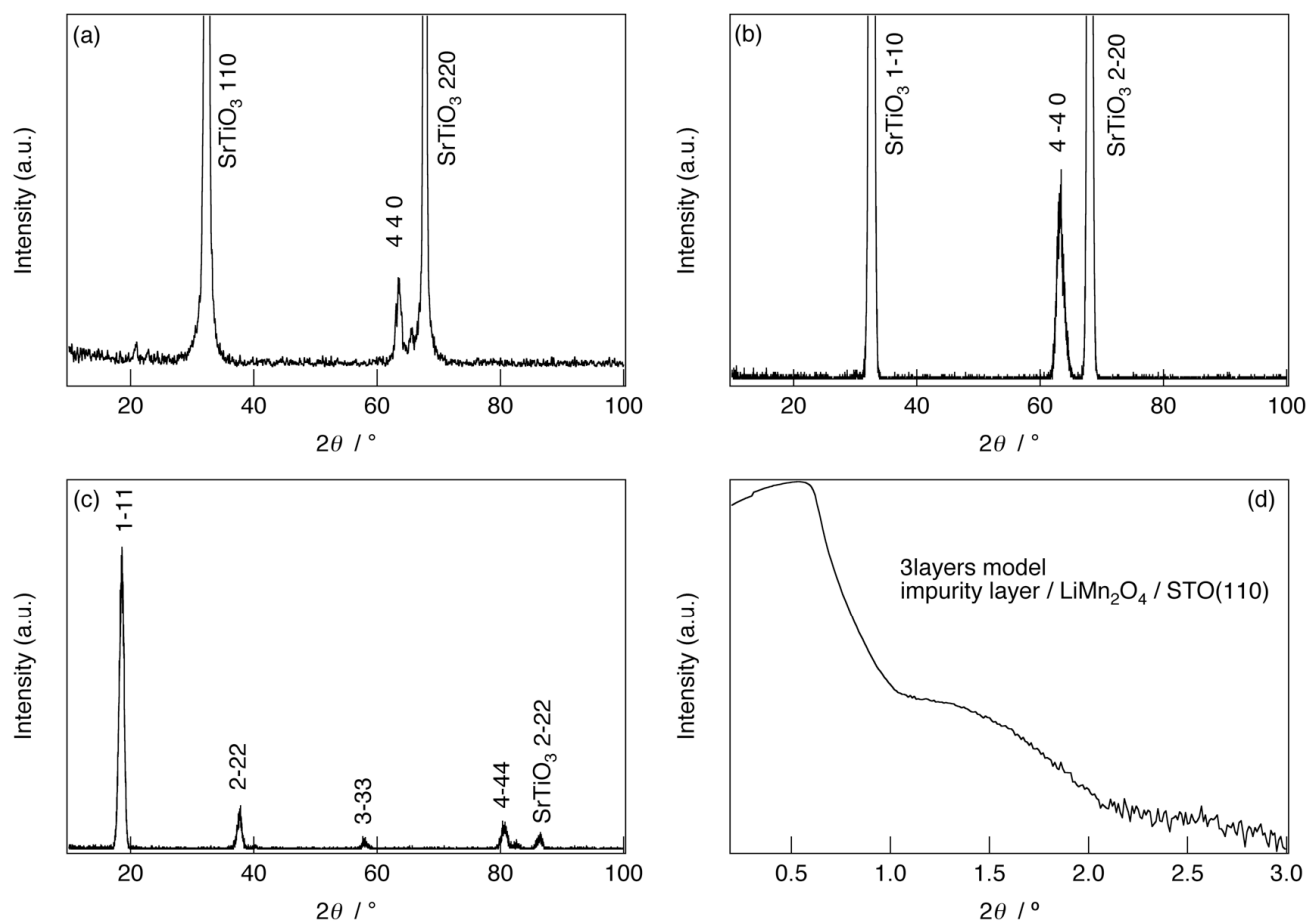


Figure S3 (a–c) XRD patterns and (d) XRR curve of epitaxial LiMn_2O_4 (110) thin film used for *in situ* XRD measurements.

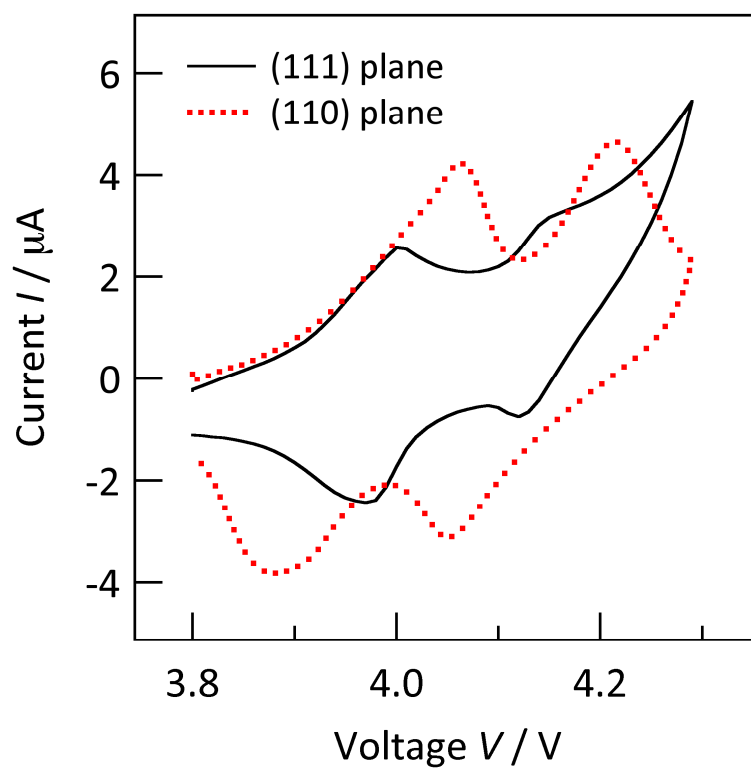


Figure S4: Cyclic voltamograms of epitaxial LiMn_2O_4 thin films with (111) and (110) orientations on $\text{SrTiO}_3\text{:Nb}$ substrates. Epitaxial SrRuO_3 buffer layers were used to improve electric conduction between LiMn_2O_4 and $\text{SrTiO}_3\text{:Nb}$.

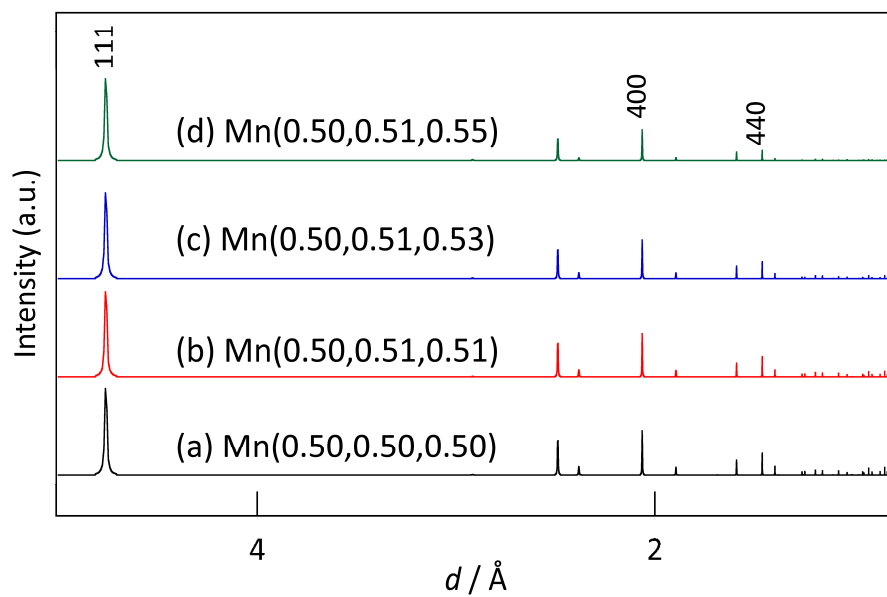


Figure S5 Simulation of the XRD patterns of LiMn_2O_4 with displaced Mn atoms.