

*Supporting Information*

**Relationship between the cycle performance and electronic structure  
in  $\text{LiAl}_x\text{Mn}_{2-x}\text{O}_4$  ( $x = 0$  and  $0.2$ ) as seen via soft X-ray spectroscopy**

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29-861-3489,

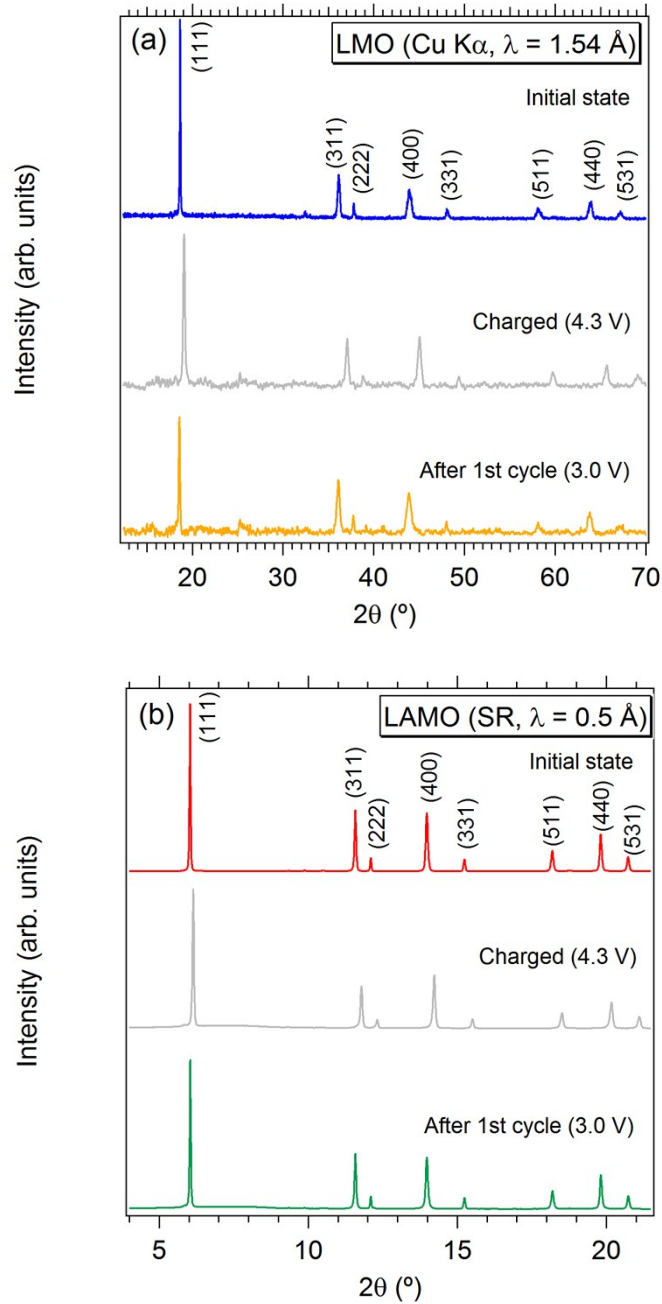
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**Present Address**

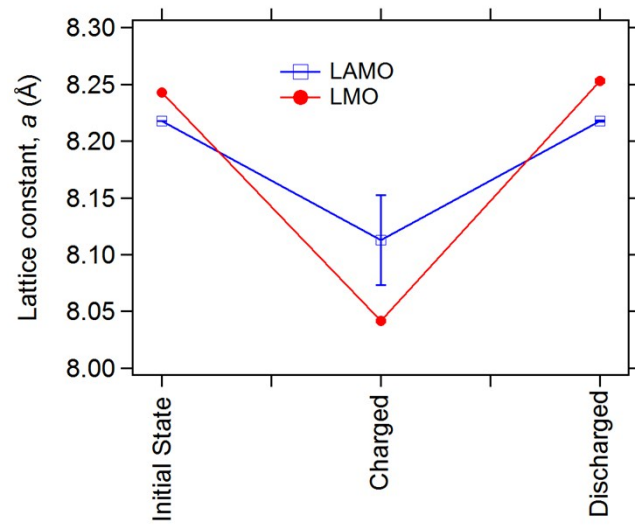
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### XRD patterns and calculated lattice parameters

Figure S1 shows the *ex situ* XRD patterns for  $\text{LiMn}_2\text{O}_4$  (LMO) and  $\text{LiAl}_{0.2}\text{Mn}_{1.8}\text{O}_4$  (LAMO). The synchrotron radiation (SR) measurements for LAMO were carried out at BL19B2, SPring-8. The wavelength  $\lambda$  of X-rays was set to 0.501 Å. On the other hand, Bruker D8 Advance with a  $\text{Cu } K\alpha$  X-ray was used for XRD measurements of LMO. We calculated the lattice parameters using the indexes of LMO with a cubic symmetry (Fig. S2). They correspond to Table 1 in the text.



**Fig. S1** XRD patterns for (a) LMO and (b) LAMO.



**Fig. S2** Calculated lattice parameters.