

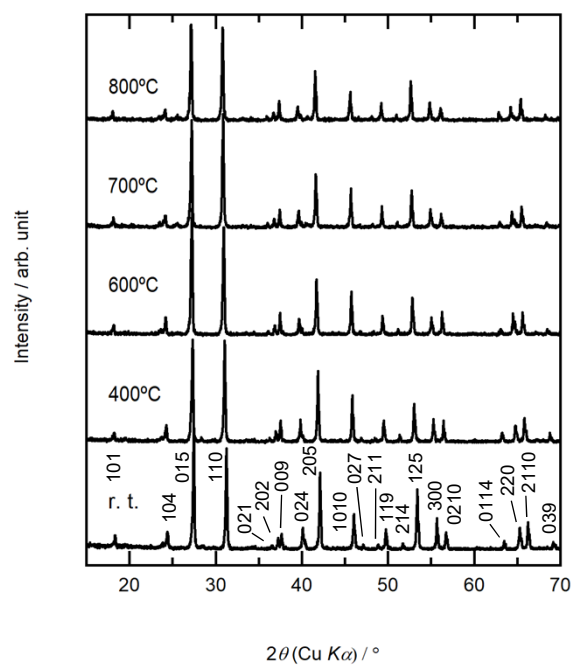


Figure 1S High temperature XRD of $\text{Ba}_3(\text{MnO}_4)_2$.

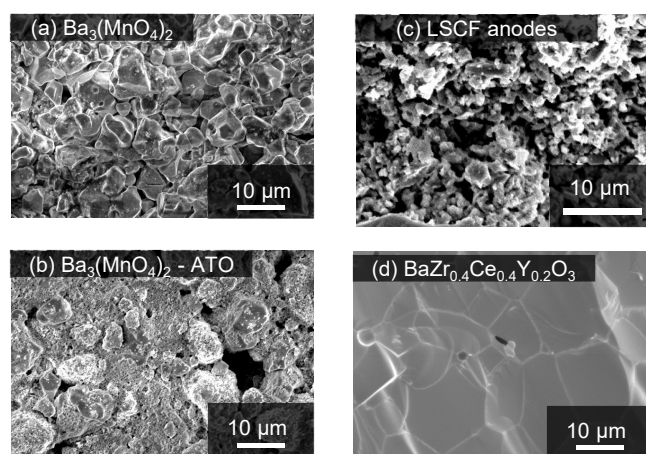


Figure 2S Surface SEM images of (a) $\text{Ba}_3(\text{MnO}_4)_2$, (b) $\text{Ba}_3(\text{MnO}_4)_2$ -ATO, (c) LSCF anodes, and (d) cross-section SEM images of $\text{BaZr}_{0.4}\text{Ce}_{0.4}\text{Y}_{0.2}\text{O}_3$ sintered disc.

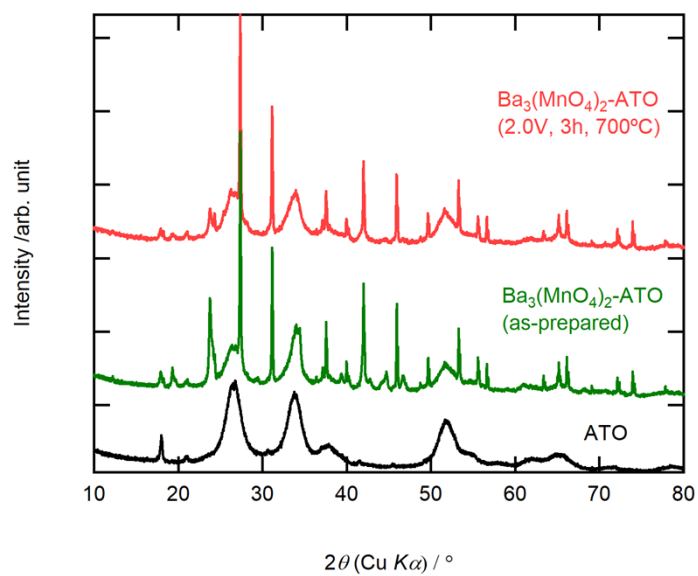


Figure 3S XRD patterns of commercial ATO and $\text{Ba}_3(\text{MnO}_4)_2$ -ATO mixed electrodes before and after electrolysis at 2.0 V for 3h at 700° C.