*Supporting Materials for:*

**Room temperature operation of magnesium rechargeable batteries with a hydrothermally treated ZnMnO3 defect spinel cathode**

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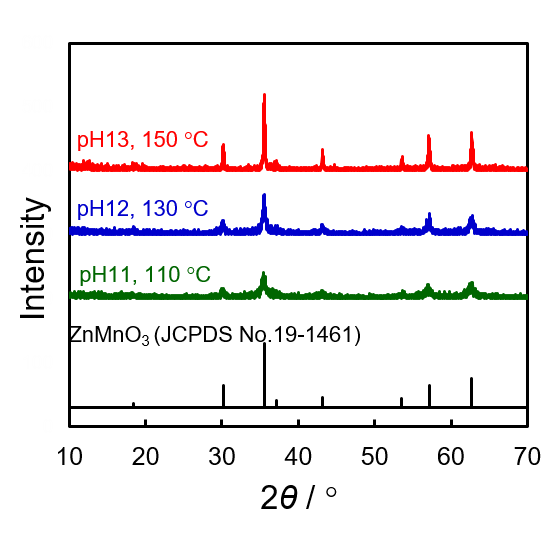
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**Fig. S1**. XRD profiles of the sample obtained from the pH13 precursor hydrothermally treated at 180 °C for 24h.



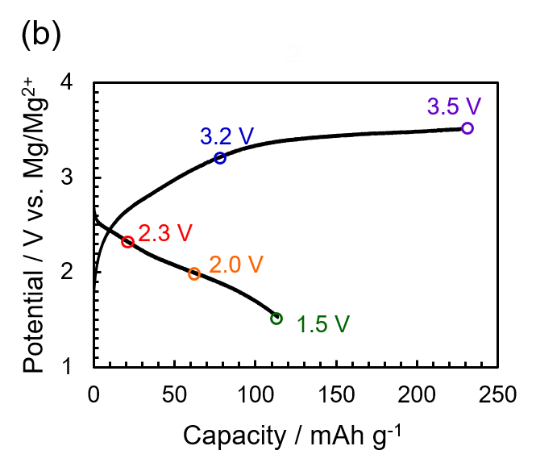
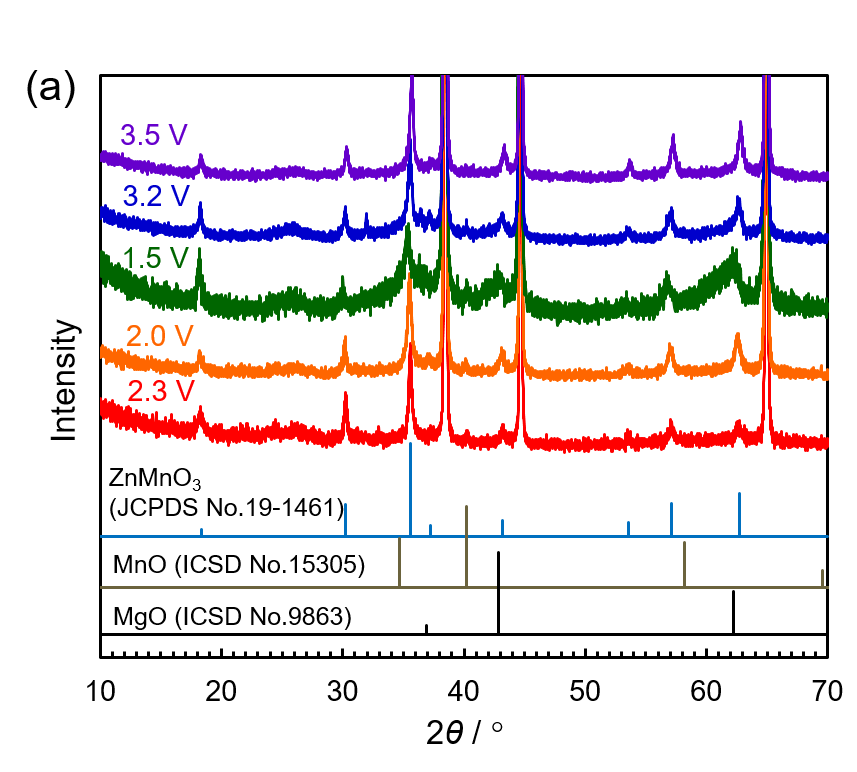
**Fig. S2**. XRD profiles of the ZnMnO3 particles prepared using the three different experimental conditions shown in Table 1 in the main text.



**Fig. S3**. Effect of hydrothermal duration on the crystallinity of ZnMnO3 obtained from the (a) pH 11 precursors treated at 110 °C and the (b) pH 12 precursors at 130 °C.



**Fig. S4**. Effect of hydrothermal duration on the crystallinity of ZnMnO3 obtained from the pH 10 precursors treated at 110 °C.



**Fig. S5**. (a) XRD profiles of the ZMO cathode retrieved from the cells at different discharged and charged states. (b) The corresponding discharge–charge curve.



**Fig. S6**. GITT curves of ZMO-10, -11, and -12 recorded at 150 °C.



**Fig. S7**. EDX mapping results of the (a) pristine and (b) cycled ZMO-12.



**Fig. S8** (a) Galvanostatic discharge–charge curves for the first and second cycles of the ZnMnO3 prepared by a coprecipitation method. (b) Corresponding discharge capacities as a function of the cycle number.