Supplementary Information (SI) for Materials Advances.

Supplementary Information

Enhancing the Cycling Performance of Manganese Oxides through Pre-sodiation for Aqueous Zn-ion Batteries

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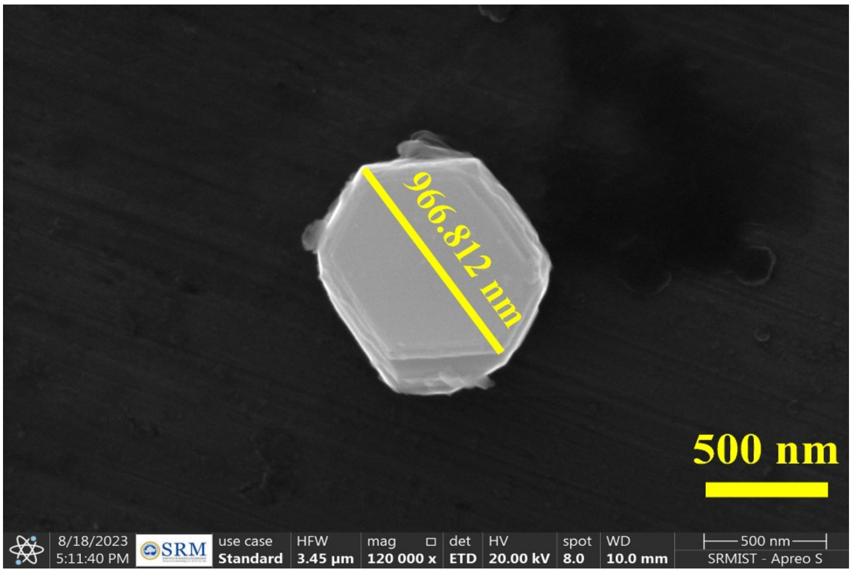

Fig. S1 HRSEM image of $Na_{0.6}MnO_2$ displaying hexagonal sheet of size 966.8 nm at the magnification of 500 nm.

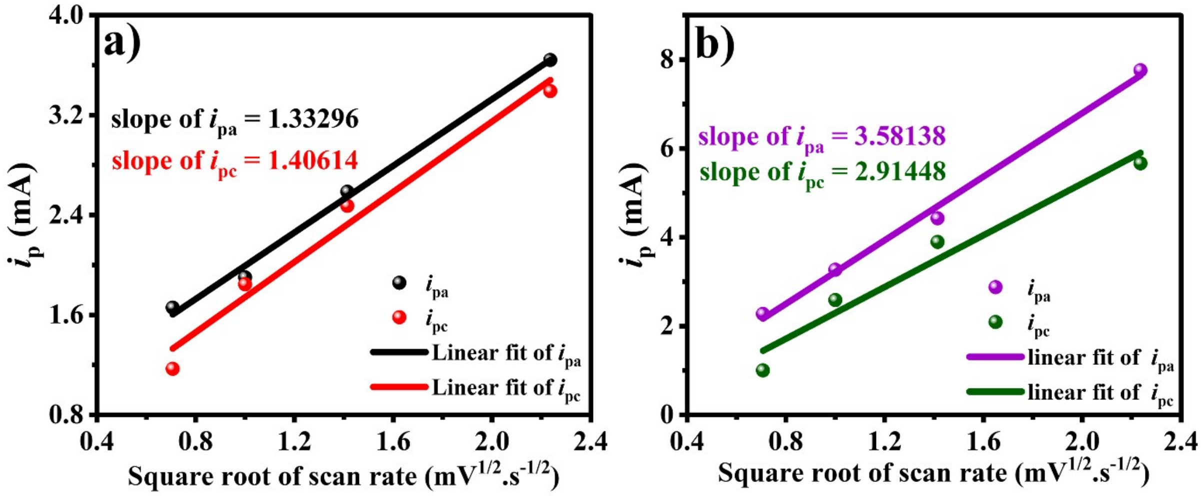

Fig. S2 (a, b) Plots of the peak current vs. square root of scan rate for $Na_{0.6}MnO_2$ and Mn_2O_3 The Zn^{2+} diffusion coefficient was calculated using Randles-Sevcik equation:

$$I_p = 2.69 * 10^5 * n^{3/2} * AC * D_{Zn^{2+}}^{1/2} * \nu^{1/2}$$

Where I_p is the peak current (mA), n is the number of electrons transferred in the half cell, A is the electrode area (cm^2), C is the concentration of Zn^{2+} ions (mol/cm^3) D is the diffusion coefficient of Zn^{2+}, and ν is the scan rate ($mV.s^{-1}$).

The diffusion coefficient ($D_{Zn^{2+}}$) was calculated and found to be 1.15 x 10^{-5} cm^2/s for $Na_{0.6}MnO_2$ and 4.96 x 10^{-5} cm^2/s for Mn_2O_3 for the corresponding reduction process from CV (Fig. 5 (b,e)). The $D_{Zn^{2+}}$ calculated using the Randles-Sevcik equation (Fig. S2) and EIS (Fig. 11 (a, c) agree well for both the cathodes.