## Synthesis and Electrochemical Properties of Mn<sub>3</sub>O<sub>4</sub> Nanocrystals with Controlled Morphologies Grown from Compact Ion Layers

Hae Woong Park<sup>a</sup>, Ho Jun Lee<sup>a</sup>, Sun-min Park<sup>a</sup> and Kwang Chul Roh<sup>\*a</sup>

<sup>a</sup>Energy & Environmental Division, Korea Institute of Ceramic Engineering and Technology,

101, Soho-ro, Jinju-si, Gyeongsangnam-do, 660-031, Republic of Korea.

\* Corresponding author: Kwang Chul Roh (<u>rkc@kicet.re.kr</u>)

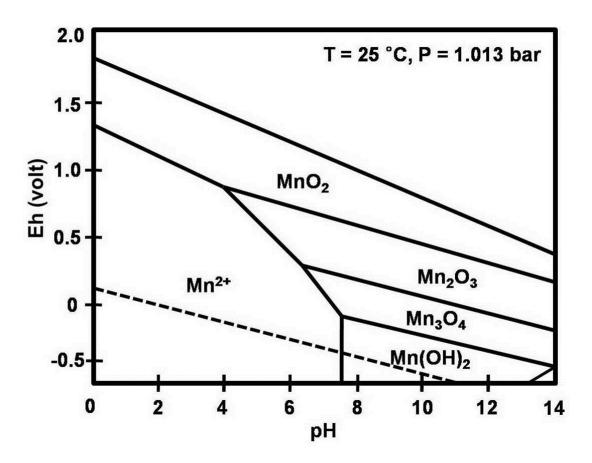
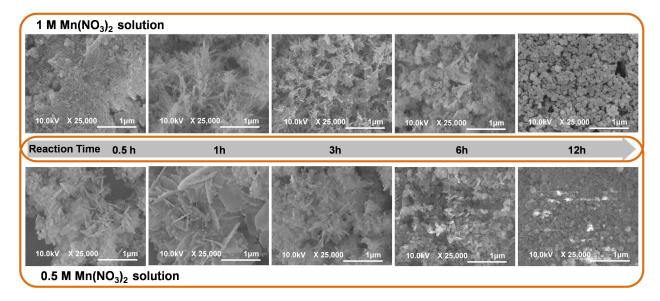


Fig. S1. The Pourbaix diagram showing the potential-pH equilibrium for manganesewater system.



**Fig. S2.** SEM images of the morphological evolution of the different-shaped  $Mn_3O_4$  nanocrystals; (a, b, c, d, e) 1 M Mn(NO<sub>3</sub>)<sub>2</sub> solution and (f, g, h, i, j) 0.5 M Mn(NO<sub>3</sub>)<sub>2</sub> solution.

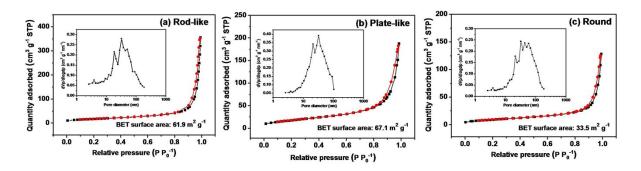
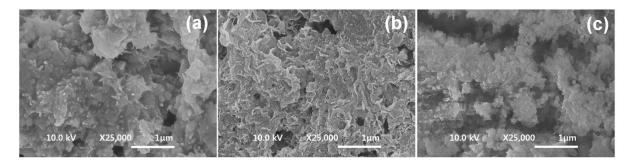


Fig. S3.  $N_2$  adsorption-desorption isotherms of  $Mn_3O_4$  samples and the insets in (a-c) are the corresponding pore size distribution curves.



**Fig. S4.** SEMs of the  $Mn_3O_4$  electrode after the charging-discharging (after 1000 cycles) experiments. (a) rod-like, (b) plate-like and (c) round  $Mn_3O_4$ .