Electronic Supplementary Information (ESI) for

The comparative lithium storage properties of urchin-like hematite spheres: hollow vs. solid

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Experimental

Materials preparation. In a typical synthesis, 0.1112 g $FeSO_4 \cdot 7H_2O$ (Sigma-Aldrich, 99.9%) was dissolved in 40 mL of a glycerol/water mixture containing 2, 3 or 5 mL glycerol. After stirring for about 10 minutes, a translucent solution was obtained and then transferred into a 50 mL Teflon-lined stainless steel autoclave, followed by heating at 120 ^oC for a period of 24 h in an electric oven. After heating, the autoclave was cooled naturally to room temperature. The precipitate was collected and washed with water and ethanol several times by centrifugation, then dried at 60 ^oC overnight. Then the precursors are calcined at 300 ^oC for 2 h, after cooling down to room temperature, hierarchical urchin-like hematite hollow spheres were obtained.

Materials characterization. The structure and morphology of products were examined with transmission electron microscopy (TEM; JEOL, JEM-2010, 200 kV), and field emission scanning electron microscopy (FESEM; JEOL, JSM-6700F, 5 kV). The powder X-ray diffraction (XRD) analysis was carried out with X-ray powder diffraction (Bruker, D8–Advance X-Ray Diffractometer,

Cu Kα, λ = 1.5406 Å). The N_2 adsorption and desorption isotherm was obtained using a Quantachrome Instruments, Autosorb AS-6B.

Electrochemical measurements. The electrochemical tests were carried out using two-electrode cells with pure lithium metal as the counter and reference electrodes at room temperature. The working electrode consists of active material (e.g., Fe_2O_3 spheres), a conductive agent (carbon black, Super-P-Li), and a polymer binder (polyvinylidene difluoride, PVDF, Aldrich) in a weight ratio of 80:10:10. The electrolyte used was 1.0 M $LiPF_6$ in a 50:50 (w/w) mixture of ethylene carbonate and diethyl carbonate. Cell assembly was carried out in an Ar-filled glovebox with concentrations of moisture and oxygen below 1.0 ppm. The charge/discharge tests were performed using a NEWARE battery tester at a constant current rate of 200 mA g^{-1} with a voltage window of 0.05–3.0 V.

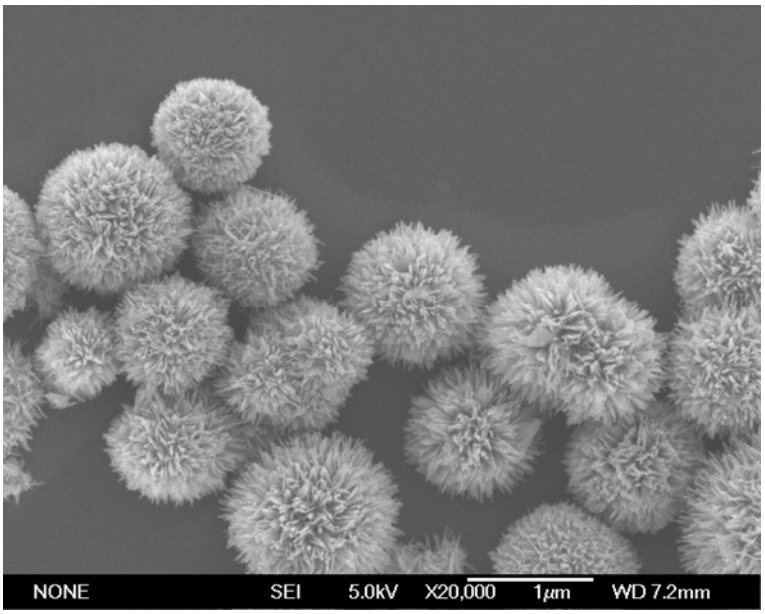

Figure S1. A typical FESEM image of sample A.

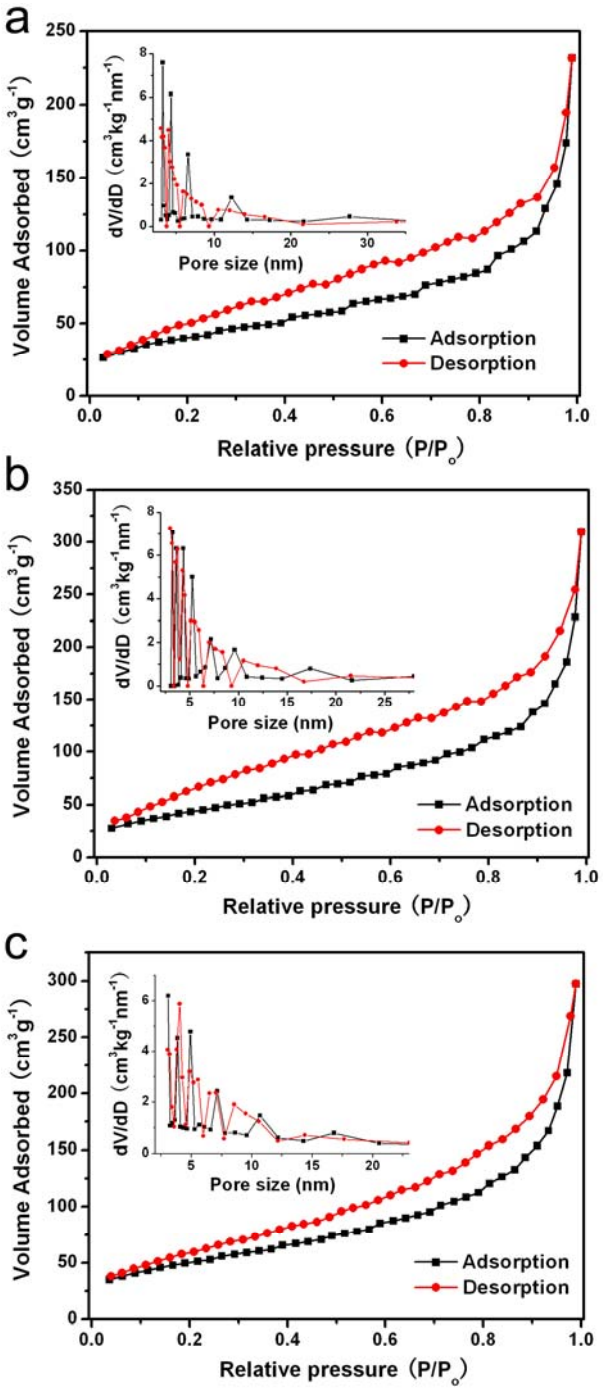

Figure S2. N_2 adsorption-desorption isotherm of sample A (a), sample B (b), and sample C (c).