

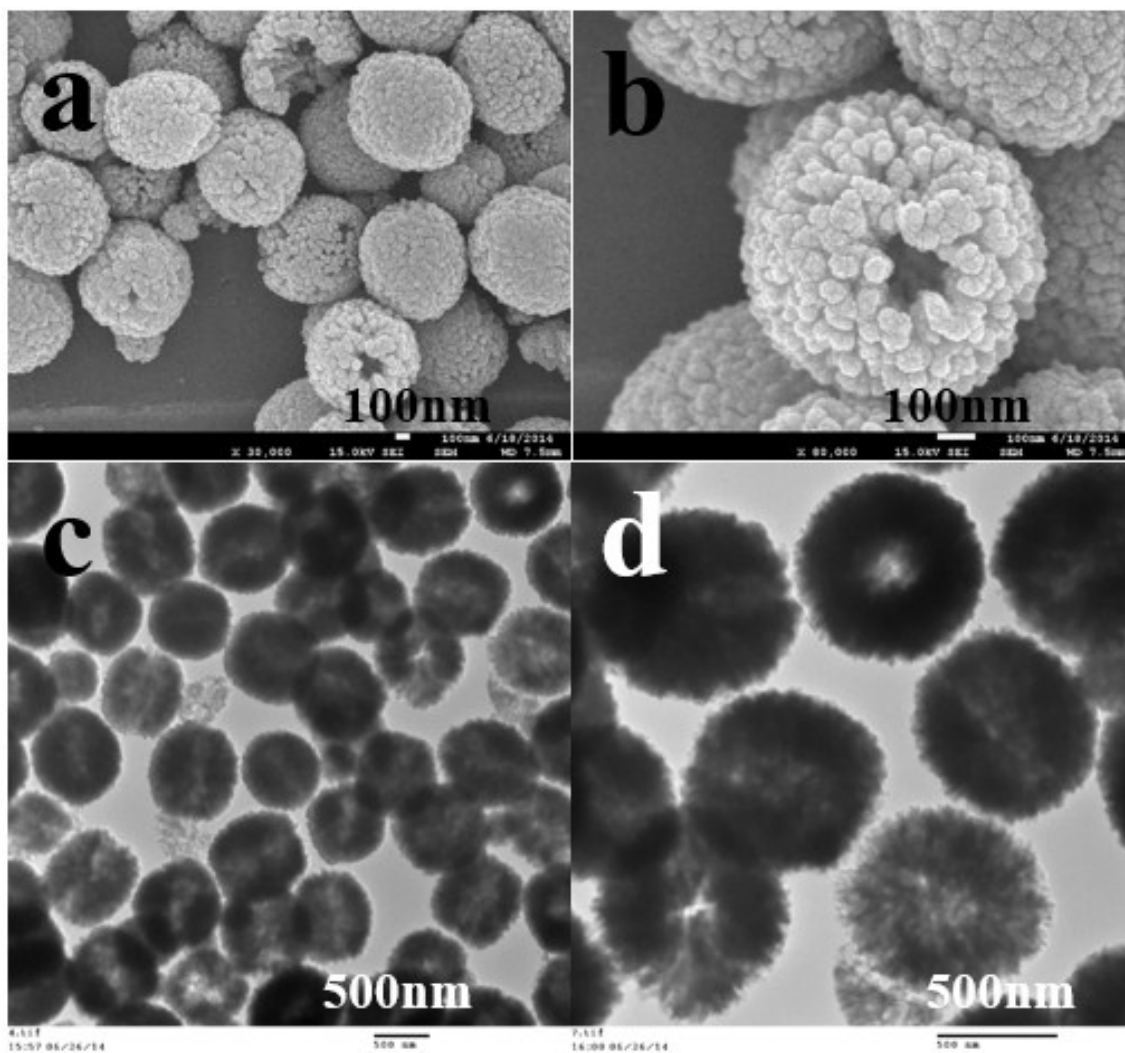
# Single-Crystalline $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> Void@Frame Microframes for Rechargeable Batteries

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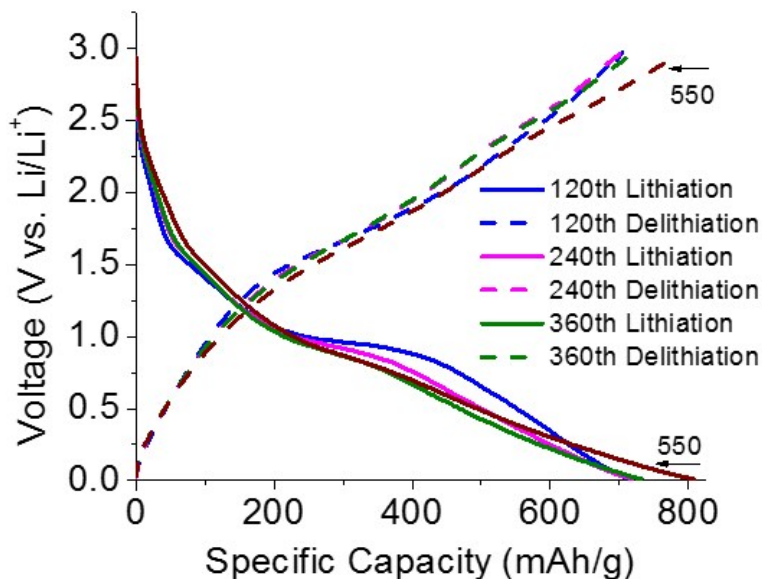
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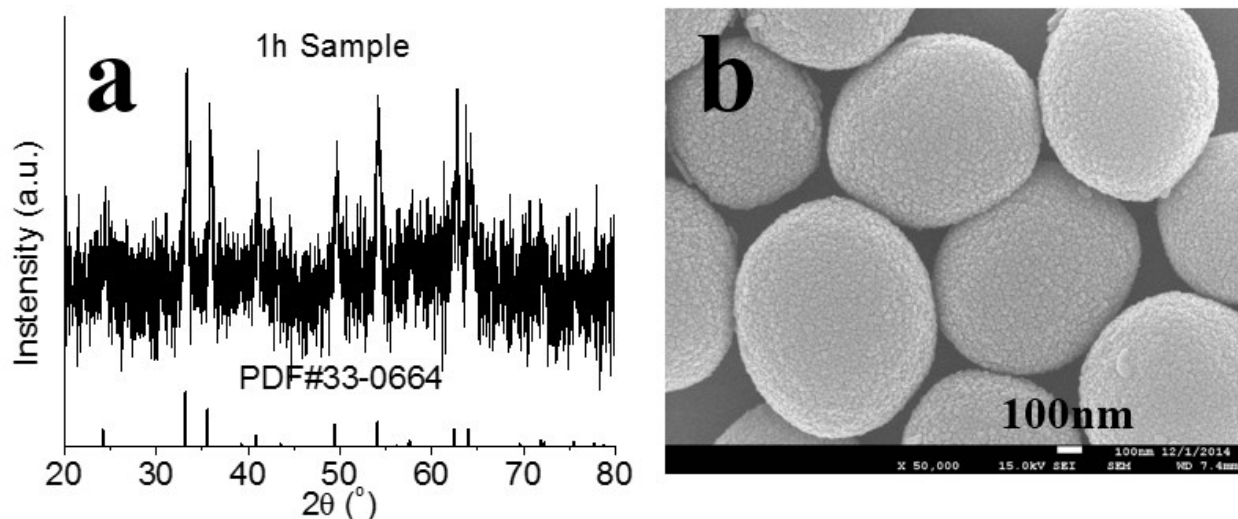
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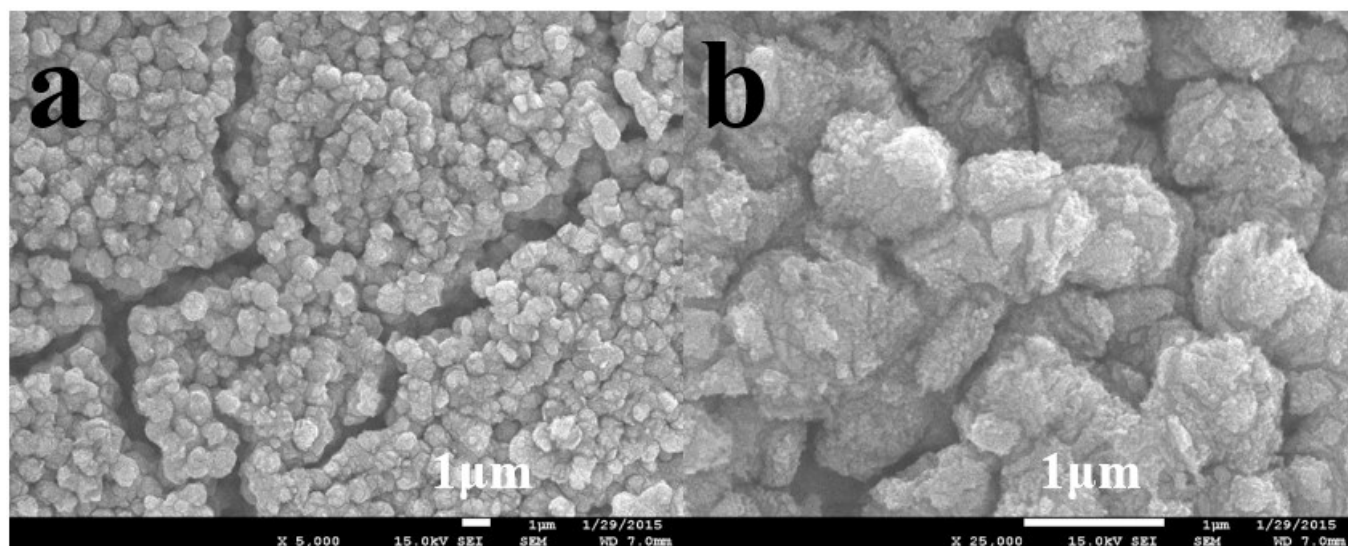
**Figure S1.** The  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> precursor used in this work: (a) Low-magnification FESEM image shows dozens of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microbeads with pore; (b) magnified FESEM image of a typical  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microbead showing the detailed structure and texture; (c) Low-magnification TEM image shows dozens of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microbeads, and (d) magnified TEM image of a few representative  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microbeads.



**Figure S2.** Charge-discharge profiles of the 120<sup>th</sup>, 240<sup>th</sup>, 360<sup>th</sup> and 550<sup>th</sup> cycles under cycling test at 200 mA/g, indicating the same electrochemical reactions involved and high reversibility.



**Figure S3.** (a) XRD and (b) FESEM image of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microstructure solid control for LIB cycling test for comparison.



**Figure S4.** (a) Low magnification and (b) magnified FESEM images for  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> microframes anode after 120-cycle rate test in LIB. The outline of the microstructures was maintained after repeated charge-discharge processes.