Supplementary Information

Porous $MnFe_2O_4$ Microrods as Advanced Anodes for Li-ion Batteries with Long Cycle Lifespan

Nana Wang,[a] Xiaojian Ma,[a] Yunpo Wang,[a] Jian Yang[a] and Yitai Qian*[a,b]

[a] *Key Laboratory of Colloid and Interface Chemistry, Ministry of Education, School of Chemistry and Chemical Engineering, Shandong University, Jinan 250100, China.*

Email: qianyt@sdu.edu.cn.

[b]*Hefei National Laboratory for Physical Science at Microscale and Department of Chemistry, University of Science and Technology of China, Hefei, 230026, China*

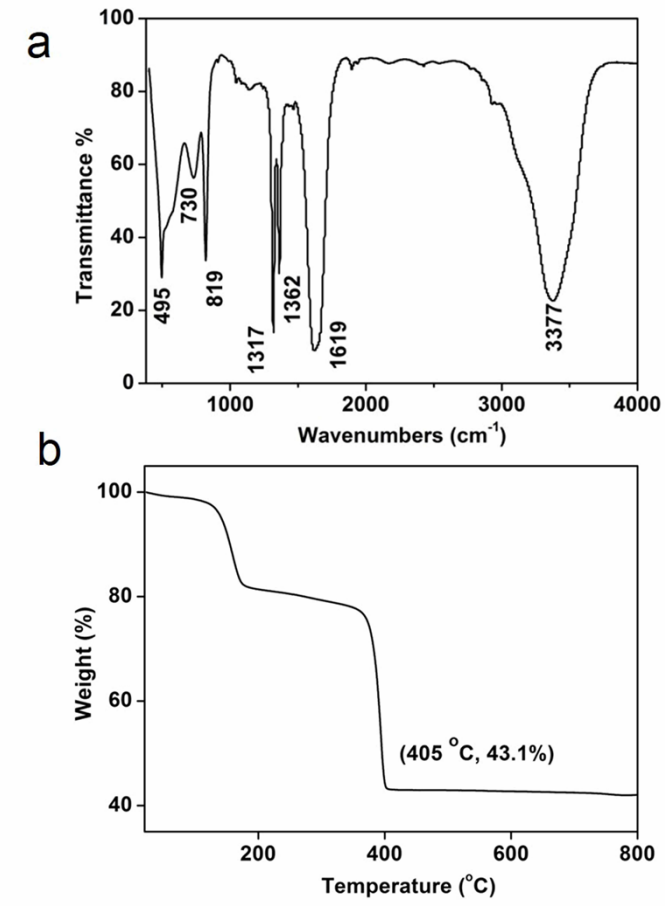

Fig. S1 (a) FTIR spectra and (b) TGA curve of the precursor.

Synthesis of $MnFe_2O_4$ nanorods: the synthesis of the FeOOH nanorods was according to our previous report.[1] First, $FeCl_3 \cdot H_2O$ (2 mmol) and KNO_3 (15 mmol) were dissolved in deionized water (40 ml) under magnetic stirring. The resulting solution was then transferred into Teflon-lined autoclave and heated to 100 °C for 12 h. The precipitate was collected, washed with water and then dried in vacuum at 60 °C overnight. The obtained FeOOH nanorods (2 mmol) were mixed with $MnC_2O_4 \cdot 2H_2O$ (1 mmol) and several drops of ethanol using ball-milling for 2 h. The homogenous slurry was dried in vacuum, followed by annealing in Ar atmosphere at 500 °C for 2 h.

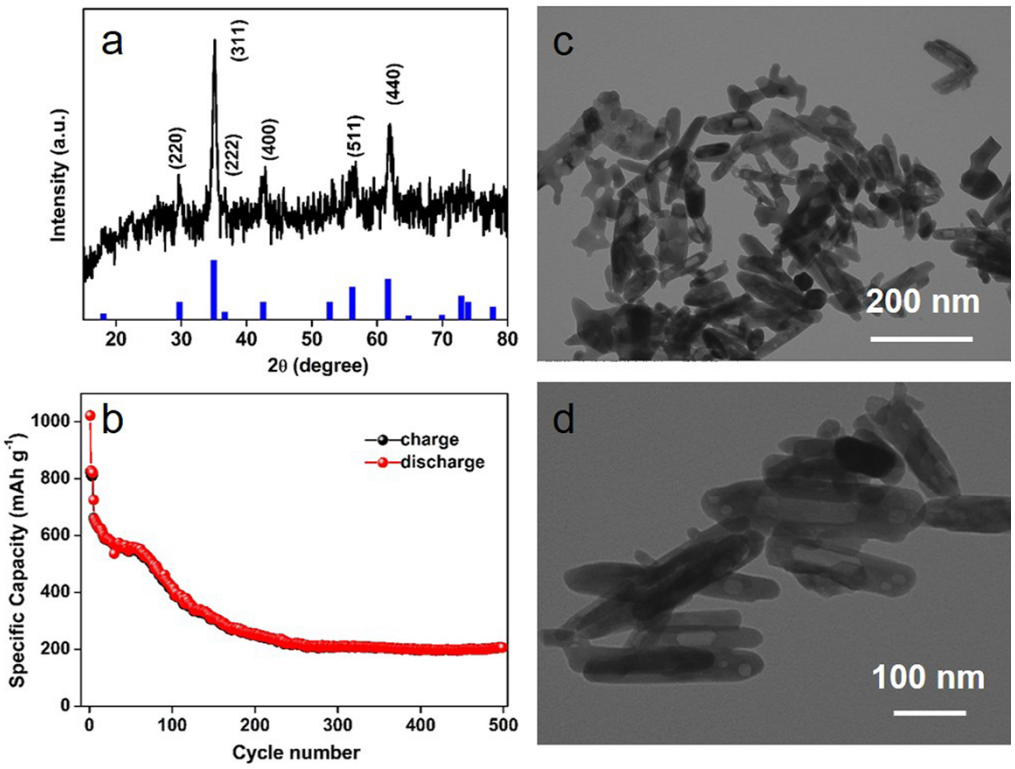

Figure S2. (a) XRD patterns and (b) cycling performance at a current density of 1 A g^{-1} (c, d) TEM images of $MnFe_2O_4$ nanorods.

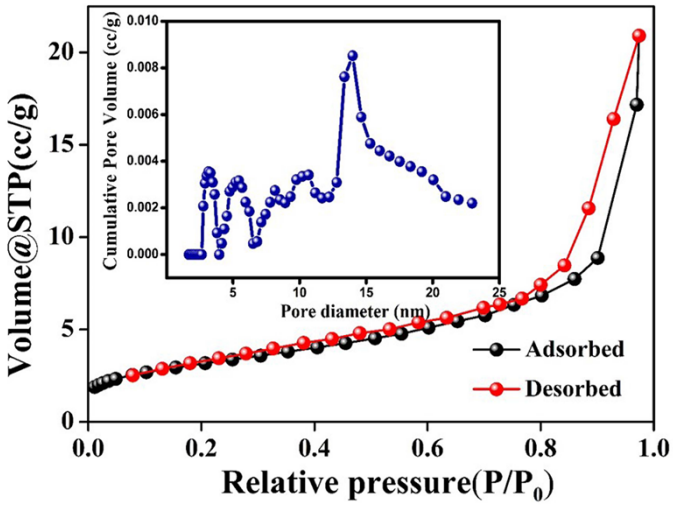

Figure S3. Nitrogen adsorption and desorption isotherms and pore size distribution (inset) of $MnFe_2O_4$ nanorods.

$MnFe_2O_4$ nanorods show diameters of ~ 50 nm and lengths of 200 nm (Figure S2c, S2d) which is shorter than porous $MnFe_2O_4$ microrods. The BET specific area and pore volume of the $MnFe_2O_4$ nanorods is 16.17 m^2 g^{-1} and the pore volume is 0.068 cm^3 g^{-1}, respectively (Figure S3). It is clearly observed that the size distribution is broad in the range of 5 ~ 15 nm, confirming the irregular pores observed in the TEM images (Figure S2d).