Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting information

Hydrothermal route to crystallization of FeOOH nanorods via $FeCl_3 \cdot 6H_2O$: effect of Fe^{3+} concentration on pseudocapacitance of iron-based materials

Kunfeng Chen, Xu Chen and Dongfeng Xue*

State Key Laboratory of Rare Earth Resource Utilization, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, China

*Corresponding author. E-mail address: dongfeng@ciac.ac.cn

Experimental method

Synthesis and characterization: FeOOH samples were synthesized by hydrolysis of $FeCl_3 \cdot 6H_2O$ with hydrothermal method. Firstly, different concentrations of $FeCl_3 \cdot 6H_2O$ solutions with the range from 0.1 to 1.0 M were prepared. Then, the solutions were transferred into Teflon vessel and carried out by hydrothermal treatment at 100 °C for 9 hours. Afterwards, the samples prepared were washed by deionized water, filtered and dried. As-obtained samples were washed, filtered and dried. Field-emission scanning electron microscopy (FESEM, Hitachi-S4800) was carried out to investigate the morphology of samples. The composition of as-obtained samples were examined using a powder X-ray diffraction (XRD) with CuKa radiation (λ = 0.15418 nm) on a Bruker D8 Focus .

Electrochemical performance test: As-prepared samples, acetylene black and polyvinylidene fluoride (PVDF) with weight ratio of 70:20:10 were mixed and grounded. Then, the above mixture was pressed on porous nickel foil in order to form working electrode. Three electrode set was used to carry out electrochemical tests. The Pt wire was used as a counter electrode and the saturated calomel electrode (SCE) was used as a reference electrode. In order to study supercapacitive performance, cyclic voltammetry (CV) and galvanostatic charge-discharge measurements were carried out by an electrochemical workstation (CHI 660D). All of the electrodes were tested in 2 M KOH aqueous electrolyte.

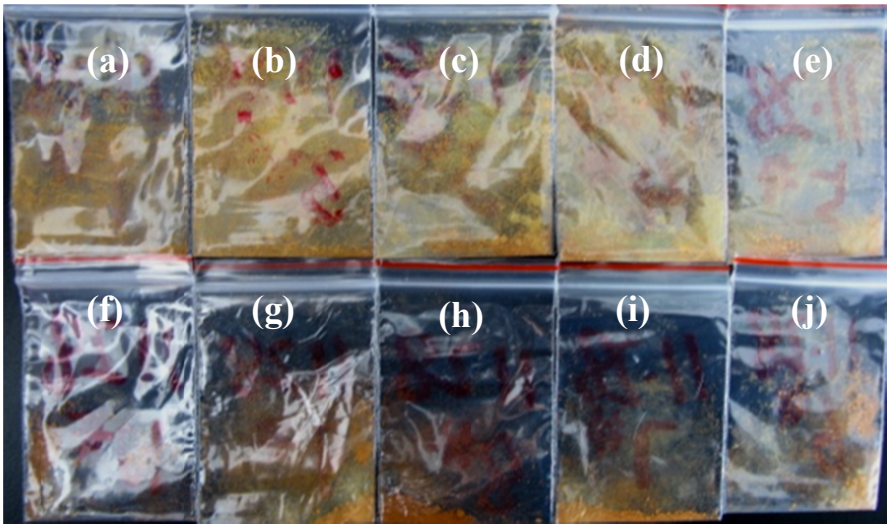

Fig S1 Optical color of as-obtained products synthesized by using $FeCl_3 \cdot 6H_2O$ procure with different concentration from 0.1 (a), 0.2 (b), 0.3 (c), 0.4 (d), 0.5 (e), 0.6 (f), 0.7 (g), 0.8 (h), 0.9 (i) to 1.0 M (j).

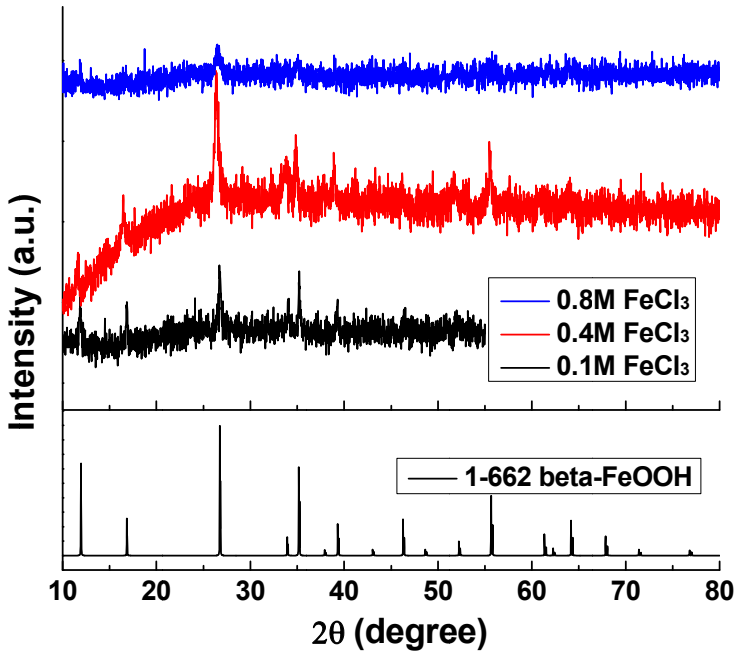

Fig S2 XRD pattern of as-synthesized β-FeOOH prepared in 0.1, 0.4 and 0.8M $FeCl_3$ solution.

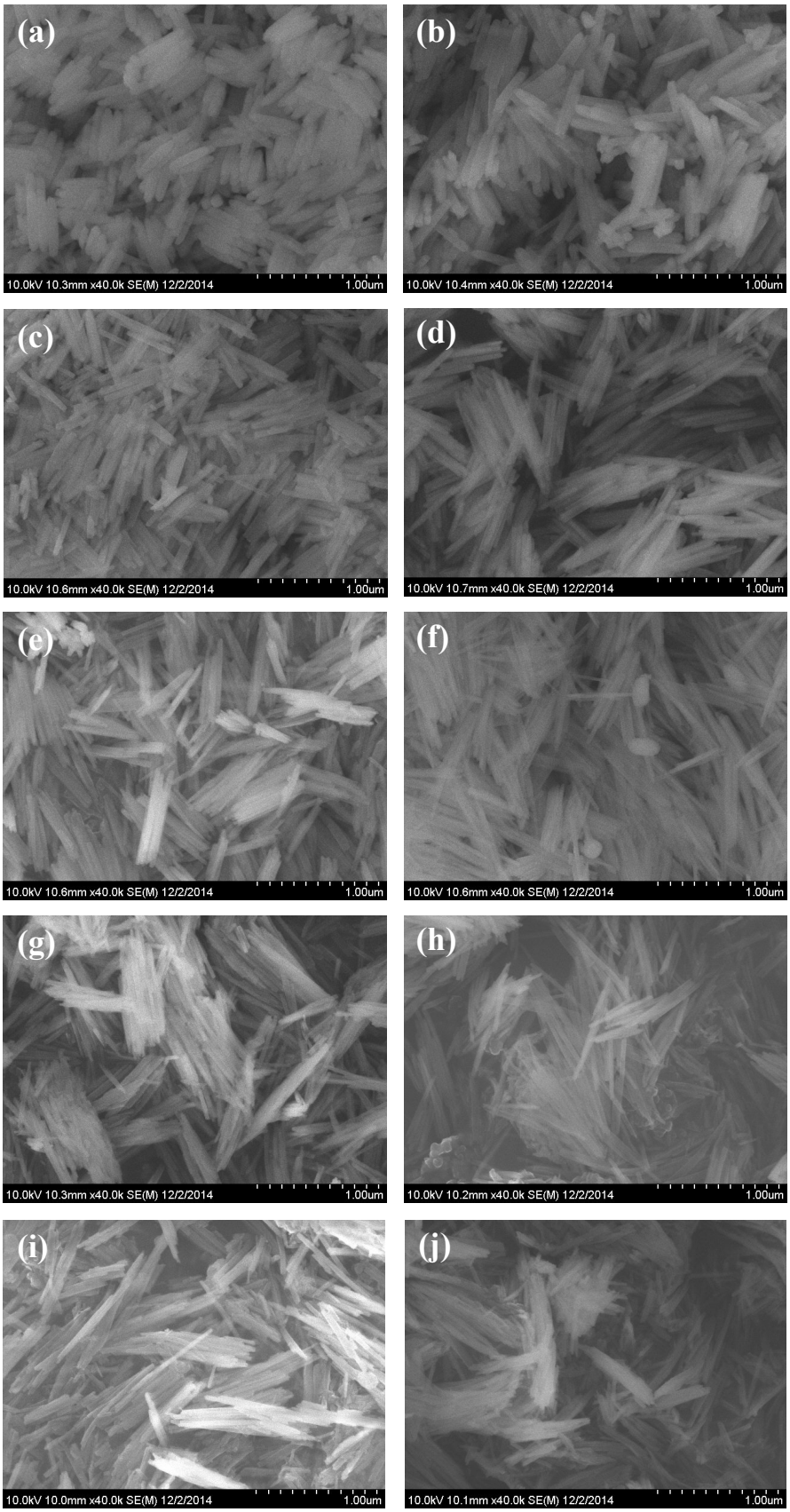

Fig S3 SEM image of the as-prepared FeOOH rods using $FeCl_3 \cdot 6H_2O$ solution with different concentration from 0.1 (a), 0.2 (b), 0.3 (c), 0.4 (d), 0.5 (e), 0.6 (f), 0.7 (g), 0.8 (h), 0.9 (i) to 1.0 M (j).

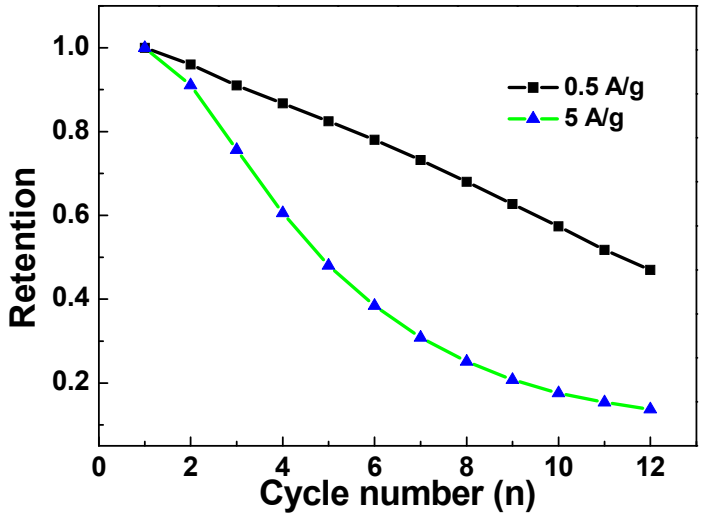

Fig. S4 Cycling performance of FeOOH electrodes synthesized in 0.2M $FeCl_3 \cdot 6H_2O$ solution at different current densities 0.5 and 5 A/g.