Electronic Supplementary Information

Nickel Flowerlike Nanostructures Composed of Nanoplates: One-pot Synthesis, Stepwise Growth Mechanism and Enhanced Ferromagnetic Properties

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Fig. S1

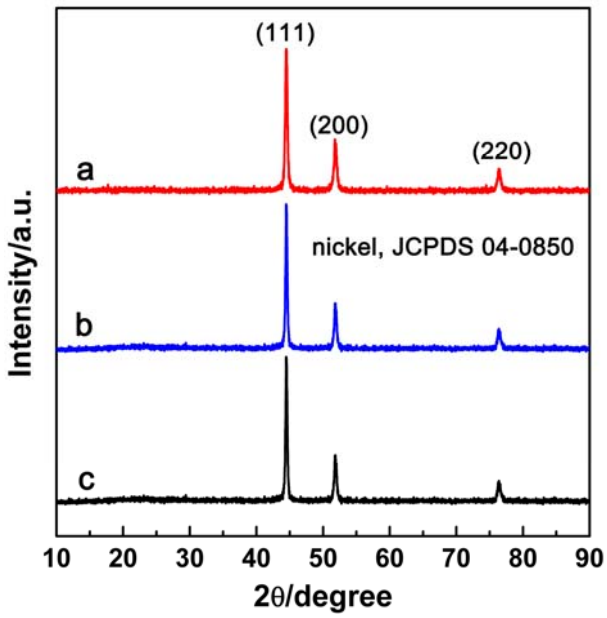

Fig. S1 XRD patterns of the product obtained at reaction time of 12 h for the solution systems with various *R* of: (a) 0, (b) 1:19 and (c) 2:18.

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Fig. S2

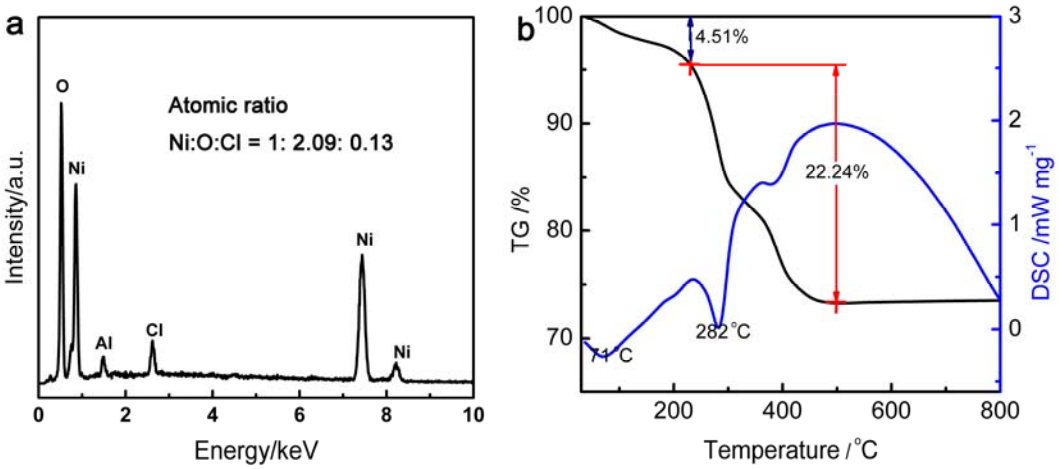

Fig. S2. EDX spectrum and TG-DSC curves of the nickel hydroxide intermediates obtained at $R = 0$ and $t = 2$ h.

Before the tests, the nickel hydroxides were washed for several times with purified water until the free Cl^- ions were removed completely (tested by 1 M $AgNO_3$ aqueous solution). Meanwhile, a minority of Ni in the sample was also removed by a strong magnet. Fig. 1(a) shows the sample consists of Ni, O and Cl elements and the atomic ratio of Ni:O:Cl is 1:2.09:0.13. The occurrence of Al peak at about 1.5 keV is because of the aluminium foil substrate which supports the sample during the test. In Fig. S2(b), the weight loss of 4.51% from room temperature to 230 °C is caused by the intercalated water. The major weight loss of 22.24% from 230 °C to 500 °C corresponds to the loss of Cl^- and dehydration of OH^- ions. The temperature ranges of the endothermic peaks in the DSC curve fits very well with those of the weight loss in the TG curve. From the EDX and TG-DSC measurements, the stoichiometry of the synthesized nickel hydroxide is estimated to be $Ni(OH)_{1.87}Cl_{0.13}{\cdot}0.22H_2O$. Together with XRD result (Fig. 4a), we can confirm from the above analyses that the nickel hydroxide obtained at $R = 0$ is α-$Ni(OH)_2$.

Fig. S3

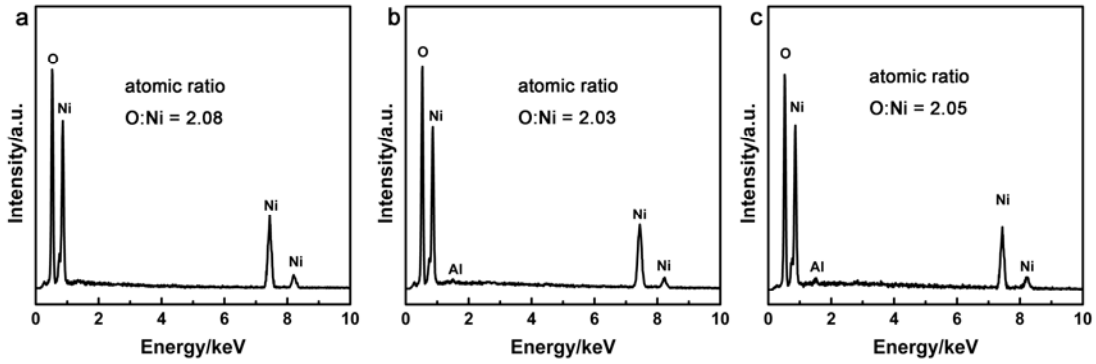

Fig. S3. EDX spectra of the nickel hydroxide intermediates obtained at reaction time of 2 h andvarious *R* of: (a) 0.5:19.5, (b)1:19 and (c) 2:18.

The results show only Ni and O elements exist in the three samples (Al comes from the substrate) and the atomic ratios of O:Ni are close to 2. Together with XRD results (Fig. 4b-d), we can confirm from the above analysis that the nickel hydroxides obtained at various *R* of 0.5:19.5, 1:19 and 2:18 all are β-$Ni(OH)_2$.

Fig. S4

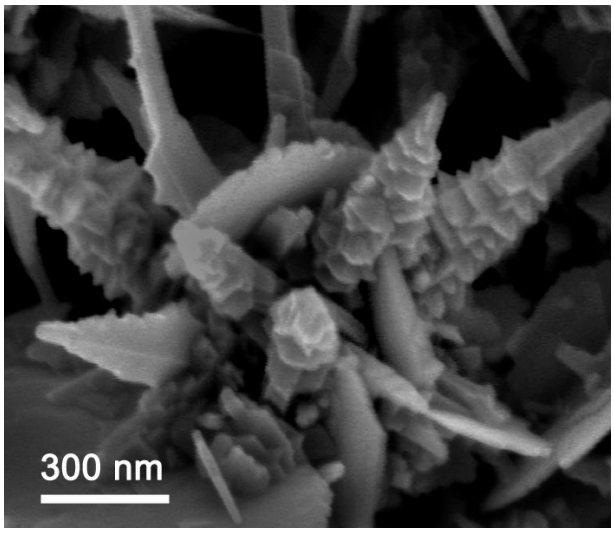

Fig. S4 SEM image of Ni products synthesized at [NaOH] = 1.5 M.

Fig. S5

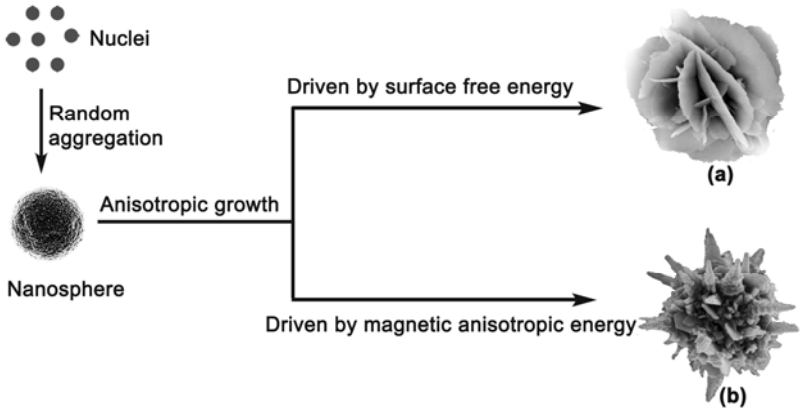

Fig. S5 Schematic illustration for the formation of Ni (a) flowerlike and (b) urchinlike nanostructures