

Experimental Section

In our experiments, all the reagents were analytical grade and used without further purification. The chemicals $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$, polyvinylpyrrolidone (PVP, K-30), 85 wt % hydrazine hydrate solution, and ethanol were purchased from the Shanghai Reagent Company (P. R. China). With the aim of getting more insight in the details of the process, we have varied the quantities of reagents, the solvent proportion, temperature and as well as reaction time. In this communication, ZF sample, $\text{AF}_{0.10\text{T}}$ sample, $\text{AF}_{0.25\text{T}}$ sample and $\text{AF}_{0.40\text{T}}$ sample were selected to study.

ZF sample: A stable green homogeneous solution was prepared by dissolving 5.0 mmol $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$, and 4.0 g PVP (K-30) in the mixed solvents of 15 mL distilled H_2O and 20 mL ethanol. Then 9.0 mL 85 wt % hydrazine hydrate was added dropwise into the solution. After vigorously stirred for 40 minutes, the solution color changed from green to purple. Subsequently, the solution was transferred into a Teflon -lined stainless steel autoclave (60 mL capacity) without a magnetic field, which was heated to and maintained at 170 °C. After 16 h, the autoclave was naturally cooled to room temperature. The black product was separated and washed with ethanol several times and then dried in a vacuum oven at 40 °C for 6 h.

$\text{AF}_{0.10\text{T}}$ sample: The synthesis procedures were similar to that of ZF sample except that the autoclave with a 0.10 T magnetic field applied.

$\text{AF}_{0.25\text{T}}$ sample: The synthesis procedures were similar to that of ZF sample except that the autoclave with 0.25 T magnetic field applied.

$\text{AF}_{0.40\text{T}}$ sample: The synthesis procedures were similar to that of ZF sample except that the autoclave with a 0.40 T magnetic field applied.

The samples obtained were characterized by X-ray diffraction (XRD) on a Rigaku (Japan) D/max- γA X-ray diffractometer equipped with graphite monochromatized $\text{CuK}\alpha$ radiation ($\lambda = 1.5418 \text{ \AA}$). The selected area electron diffraction patterns were generated with a Hitachi H-800 transmission electron microscope and high-resolution transmission electron microscope (HRTEM) (JEOL-2010). Field Emission Scanning Electron Microscopy (FESEM) was also taken with a JEOL JSM—6700F apparatus. Before observed by FESEM, all the samples in our experiments have been processed by 250 W/40KHZ ultrasonic for ten minutes. Magnetic studies were carried out with a vibrating sample magnetometer on a Quantum Design Physical Properties Measurement System (PPMS-9T).