Experimental Section

Figure S1. Representative TEM images of magnetic colloidal nanoparticles. (a) Low and (b) High magnification

Figure S2. Raman spectrum of the as-prepared samples.

Figure S3. FT-IR spectrum of the as-prepared samples.

Figure S4. The hysteresis loop measured at room temperature for the as-prepared colloidal nanochains. The inset shows the respective expanded plots for field between −10 and 10 Oe.

2. Experimental Section

2.1. Materials

Ferrocene ($Fe(C_5H_5)_2$, ≥98%), hydrogen peroxide (H_2O_2, 30%), and acetone (C_3H_6O) (≥99%) were of analytic grade (AR) from the Shanghai Chemical Factory, China. All chemicals were used as received without further purification.

2.2. Synthesis of Colloidal Nanoparticles

In a typical synthesis, ferrocene (0.30 g) were dissolved in an acetone (30 ml) solvent. After intense sonication for 30 min, 1.0 mL of hydrogen peroxide was slowly added into the above mixture solution, which then was vigorously stirred for 30 min with a magnetic stirring apparatus. After that, the precursor solution was transferred to the Teflon-lined stainless autoclave with the total volume of 50.0 mL, and then heated to and maintained at 230 °C. After 72 h, the autoclave was cooled naturally to room temperature and monodisperse colloidal nanoparticles were obtained (Figure S1). After intense sonication for 15 min, the products from the Teflon-lined stainless autoclave were magnetized for 30 min by a magnet with 0.20 T and the supernatant was discarded under magnetic field.

2.3. Preparation of Peapod-like Magnetic Nanochains

The precipitates containing monodisperse superparamagnetic colloidal nanoparticles were washed with acetone three times under an external magnetic field (0.20 T) for 24 h. Finally, the peapod-like nanochains were prepared and the black products were dried at room temperature in a vacuum oven.

2.4. Sample Characterization

Surface charge was measured using Particles Analyzer (Delsa Nano C) from Beckman Coulter. The powder X-ray diffraction (XRD) patterns were collected on a Japan Rigaku D/MAX-cA X-ray diffractometer equipped with Cu Kα radiation(λ = 1.54178 Å) over the 2θ range of 10–70 °. Transmission electron microscopy (TEM) images were obtained on Hitachi H-800 transmission electron microscope, using an accelerating voltage of 200 kV. High-resolution transmission electron microscopy (HRTEM) images were taken on a JEOL-2010 transmission electron microscope operating at 200 kV. Field emission scanning electron microscopy (FE-SEM) images were performed on a JEOL JSM-6700 M scanning electron microscope. The FT-IR spectrum was obtained using a Magna-IR 750 spectrometer in the range of 400-4000 cm^{-1} with a resolution of 4 cm^{-1}. The Raman spectrum was taken on a LABRAM-HR Confocal Laser Micro-Raman spectrometer using an Ar^{+} laser with 514.5 nm at room temperature. The reflection spectra were recorded using a fiber spectrometer (AvaSpec-2048, Avantes).
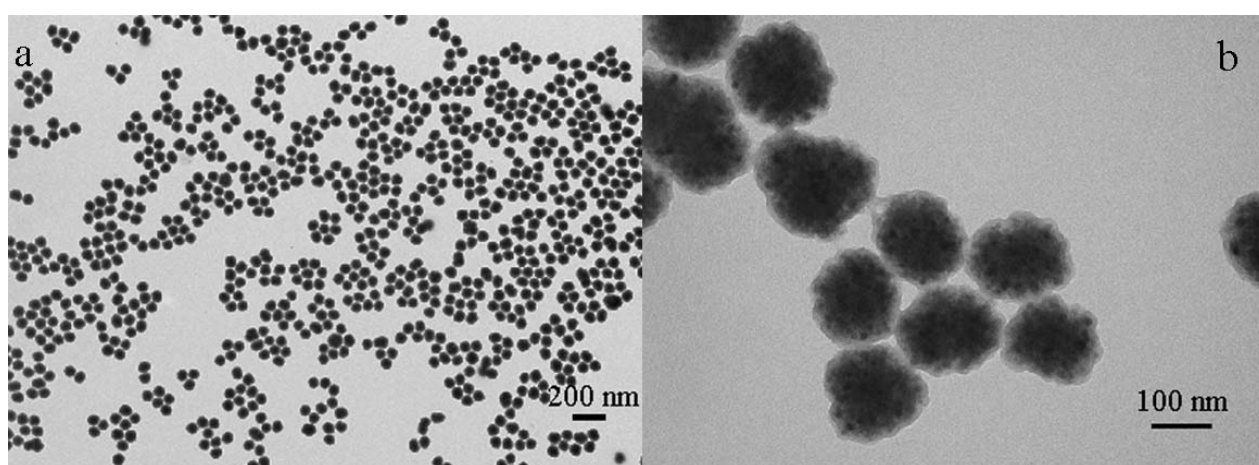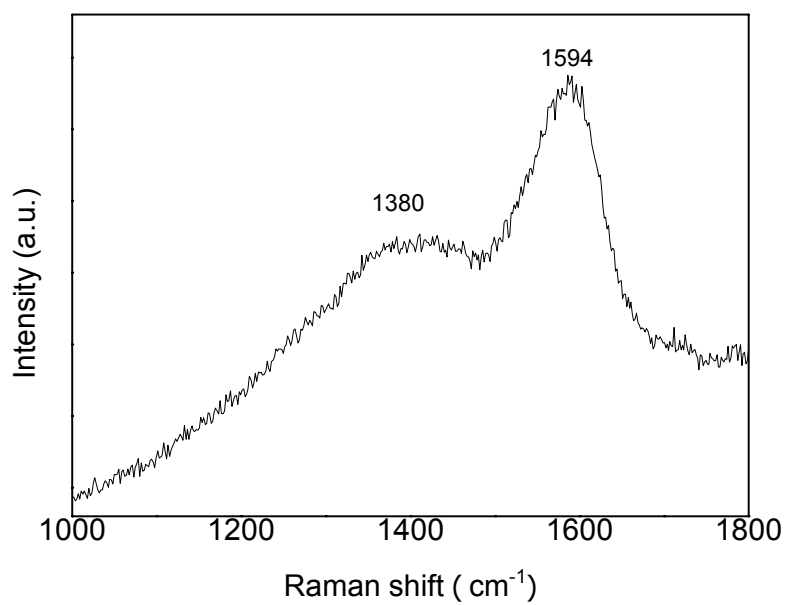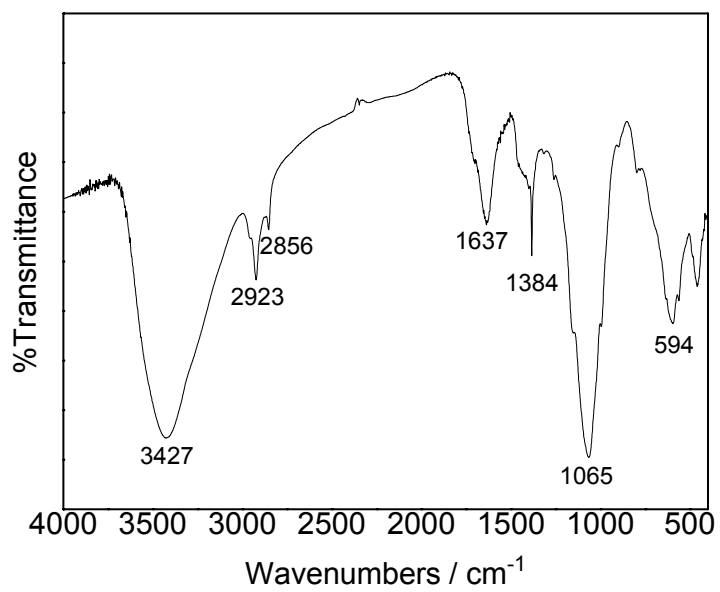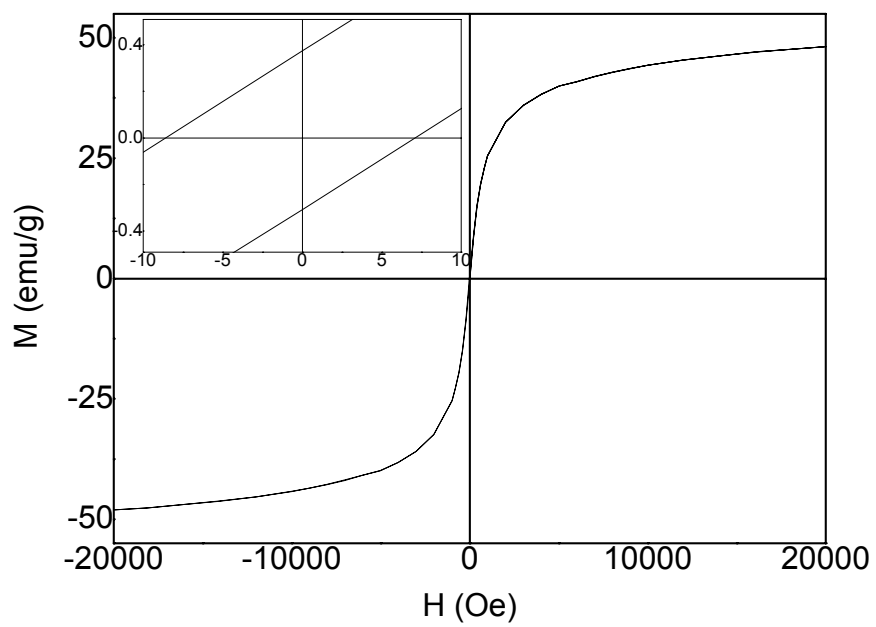

Figure S1.

Figure S2.

Figure S3.

Figure S4.