Electronic supplementary information (ESI) available

Self-Assembled Mesoporous Co and Ni-Ferrite Spherical Clusters Consisting of Spinel Nanocrystals Prepared using a Template-Free Approach

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Table S1. FWHM values of the main diffraction peaks and the crystallite size for M-$CoFe_2O_4$ with the respective diffraction planes.

h	k	l	2θ (deg.)	*d*-spacing (nm)	Intensity (a.u.)	FWHM (2θ)	Crystallite size (nm)
1	1	1	18.10	0.48	22.9	1.16	6.85
2	2	0	30.14	0.29	32.5	1.28	6.35
3	1	1	35.44	0.25	100.0	1.12	7.36
4	0	0	42.98	0.21	22.6	1.16	7.28
4	2	2	53.54	0.17	13.0	1.64	5.36
5	1	1	57.00	0.16	27.7	1.60	5.58
4	4	0	62.64	0.15	36.8	1.44	6.38

Table S2. FWHM values of the main diffraction peaks and the crystallite size for M-$NiFe_2O_4$ with the respective diffraction planes.

h	k	l	2θ (deg.)	*d*-spacing (nm)	Intensity (a.u.)	FWHM (2θ)	Crystallite size (nm)
1	1	1	17.98	0.48	32.4	1.60	4.97
2	2	0	30.06	0.29	43.3	1.48	5.50
3	1	1	35.42	0.25	100.0	1.48	5.57
4	0	0	42.92	0.21	30.7	1.04	8.12
4	2	2	53.30	0.17	15.9	1.62	5.53
5	1	1	56.74	0.16	31.7	1.00	8.93
4	4	0	62.48	0.15	42.0	1.56	5.89

Table S3. The physical properties of as-synthesized mesoporous ferrite clusters (as-M-$CoFe_2O_4$ and as-M-$NiFe_2O_4$).

Samples	Cluster size (nm)[a]	Surface area ($m^2\ g^{-1}$)	Pore diameter (nm)	Pore volume ($cm^3\ g^{-1}$)
as-M-$CoFe_2O_4$	162	103	3.42	0.14
as-M-$NiFe_2O_4$	167	111	3.39	0.12

a: the mean ferrite cluster size was measured using DLS

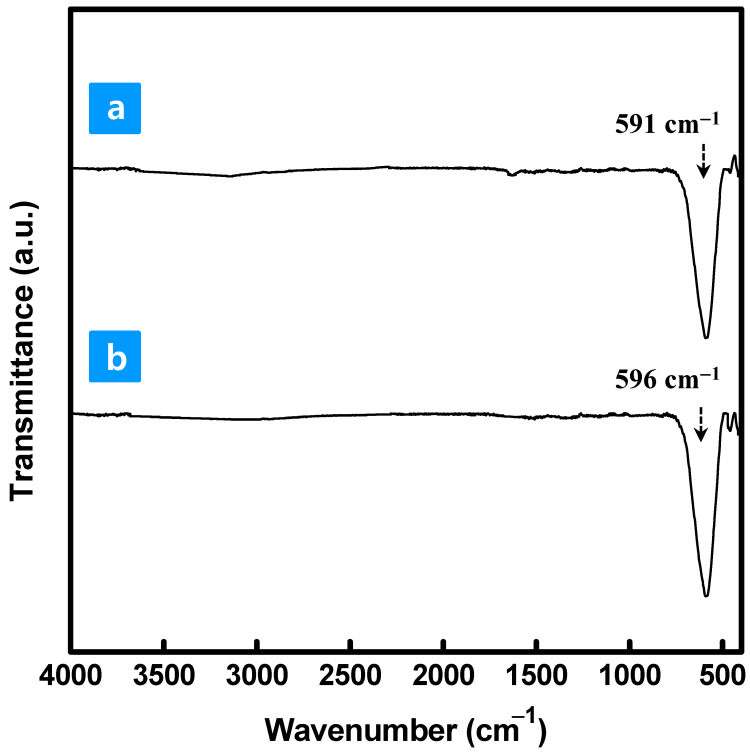

Fig. S1 FT-IR spectra of (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$.

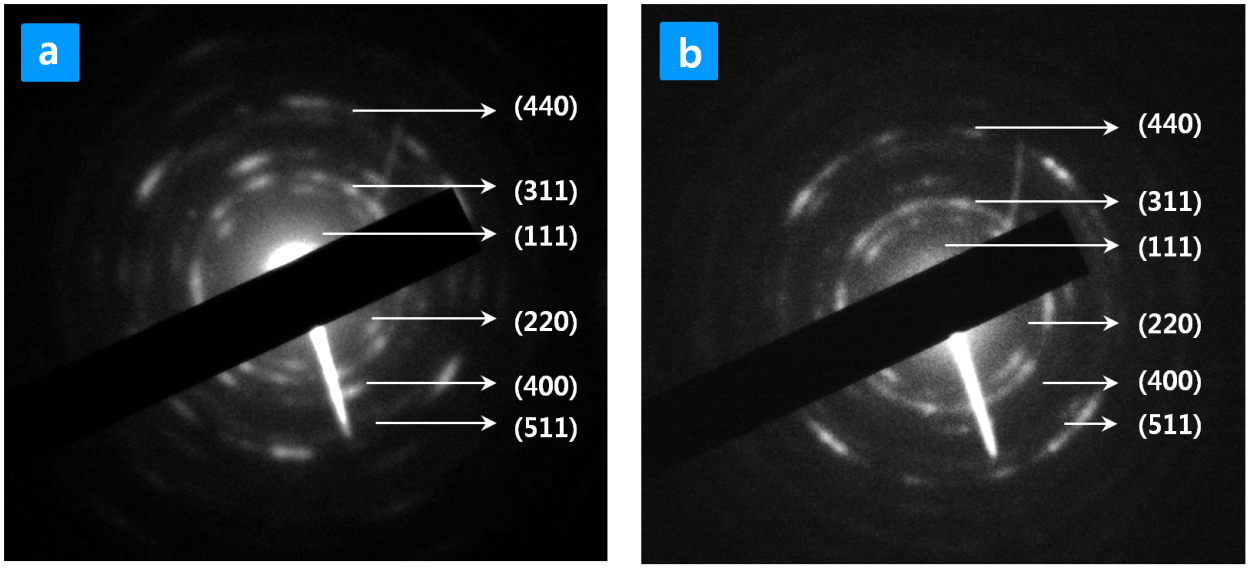

Fig. S2 Selected area electron diffraction (SAED) patterns acquired from a particular (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$ cluster.

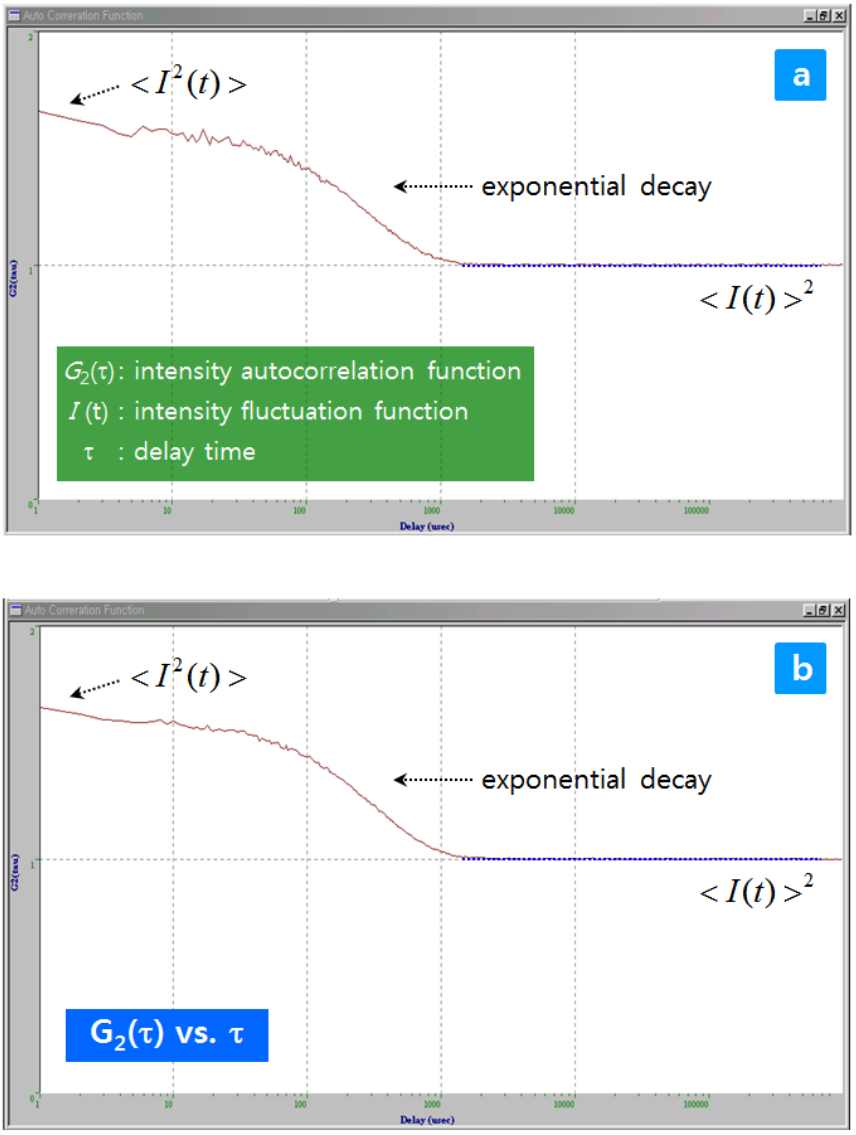

Fig. S3 The intensity auto-correlation function (ACF), $G_2(\tau)$ for (a) M-$CoFe_2O_4$, (b) M-$NiFe_2O_4$ samples in DLS.

The second-order correlation function $G_2(\tau)$ can be expressed as a function of the first-order correlation function $G_1(\tau)$ according to the Siegert relation: $G_2(\tau) = B\left(1 + \beta G_1(\tau)^2\right)$, where B is the baseline constant and β is a coherence constant. In the case of a perfect setup, both equal unity. In the case of single-exponential decay, $G_1(\tau)$ can be expressed in terms of a typical decay rate Γ and time t; $G_1(\tau) = \exp(-\Gamma\tau)$.

The apparent translational diffusion coefficient, *D,* is given by equation: $\Gamma = Dq^2$, where q is the magnitude of the scattering vector $q = 4\pi n \sin(\theta/2)/\lambda$, where n is the refractive index of the solvent, θ is the scattering angle, and λ is the wavelength of the incident light. For spherical particles, the translational diffusion coefficient can be related to the hydrodynamic radius, R, according to the Stokes-Einstein equation: $D = k_B T/6\pi\eta R$, where D is the diffusion coefficient of the Brownian motion of spherical particles, k_B is the Boltzmann constant, T is the absolute temperature, and η is the viscosity of the solvent. The hydrodynamic radius distribution of particles, G(R) was estimated using the COTIN algorithm, which is conventionally used to determine the inverse Laplace transform of the measured amplitude autocorrelation function.[1, 2]

(1) R. Finsy, *Adv. Colloid Interfac.* 1994, **52**, 79.

(2) I. K. Voets, A. De Keizer, M. A. Cohen Stuart and P. De Waard, *Macromolecules* 2006, **39**, 5952.

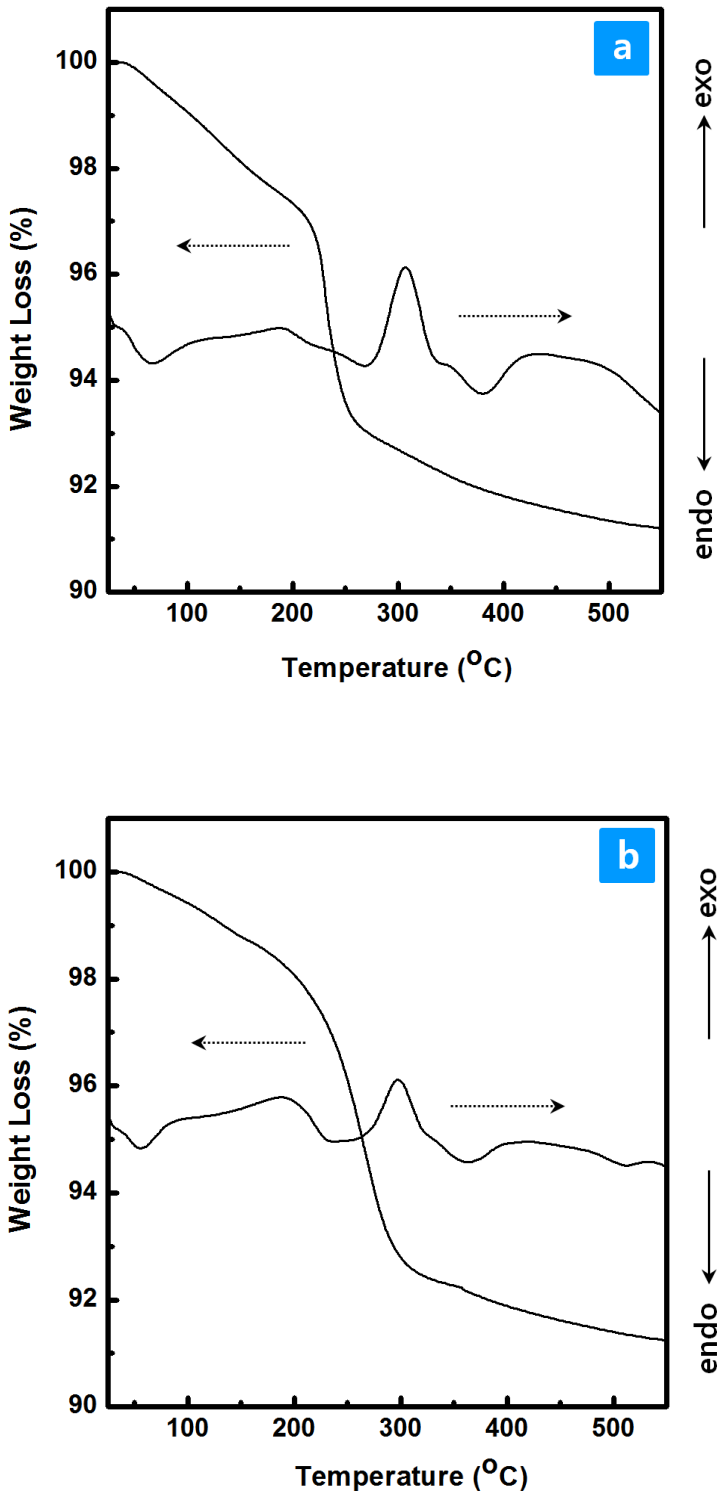

Fig. S4 TGA and DSC curves of as-prepared (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$ before calcination.

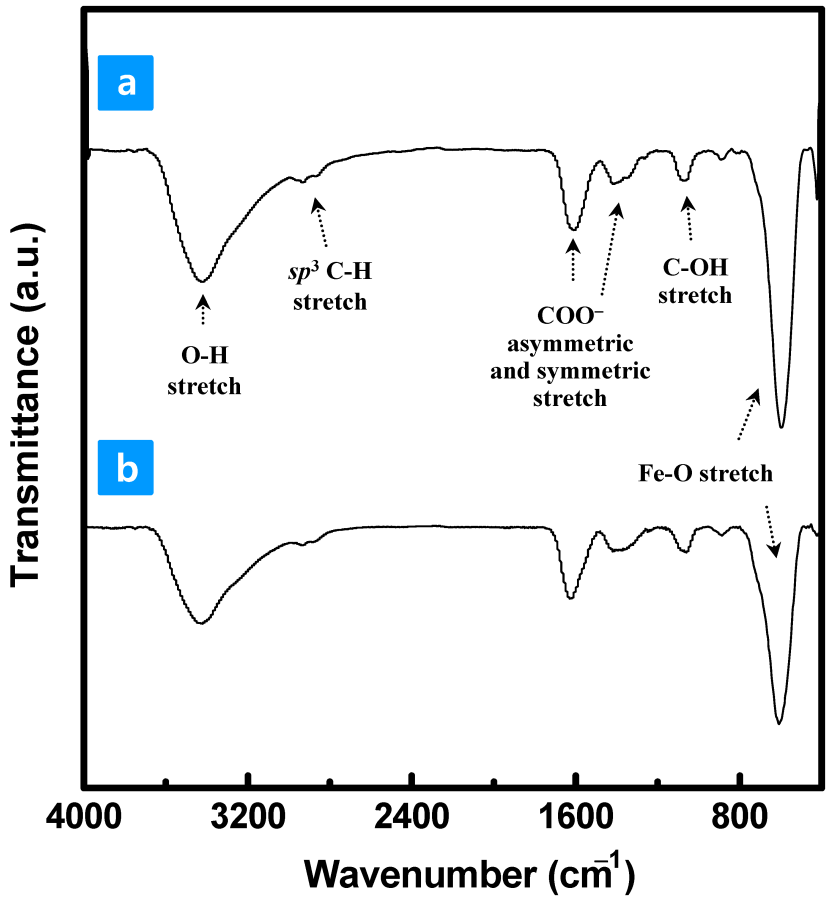

Fig. S5 FT-IR spectra of as-synthesized (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$ before calcination.

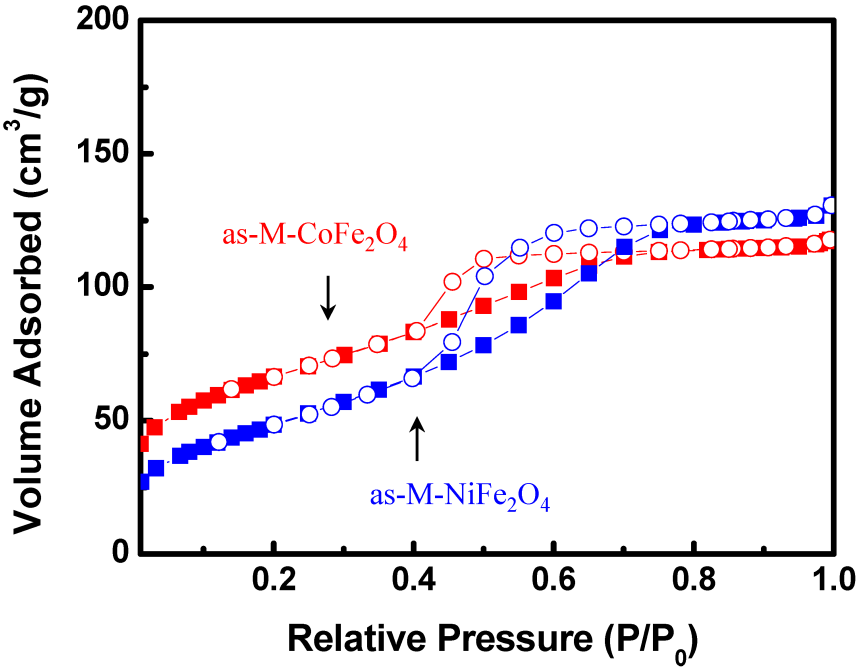

Fig. S6 N_2 adsorption(■) -desorption(○) isotherms for as-synthesized (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$.

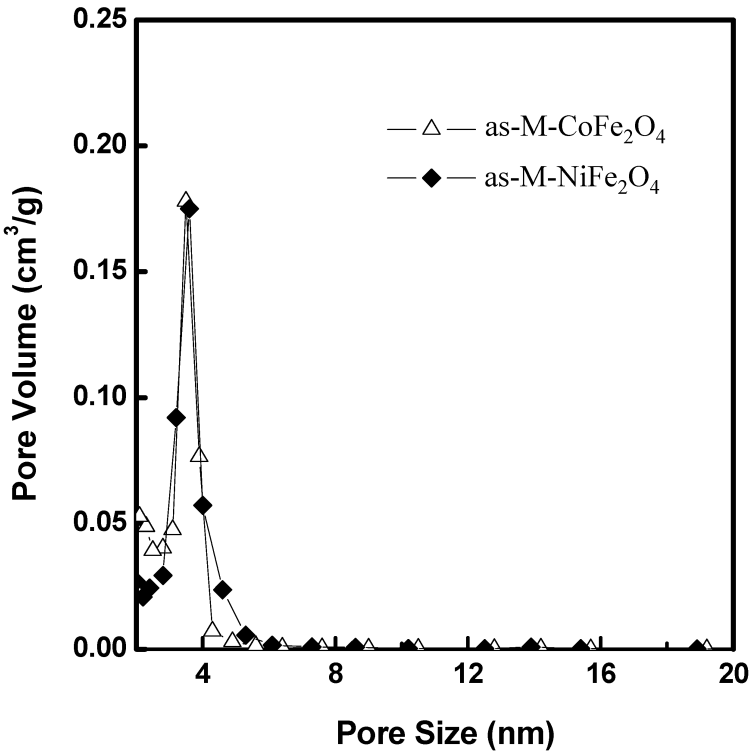

Fig. S7 The pore size distribution of as-synthesized (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$.

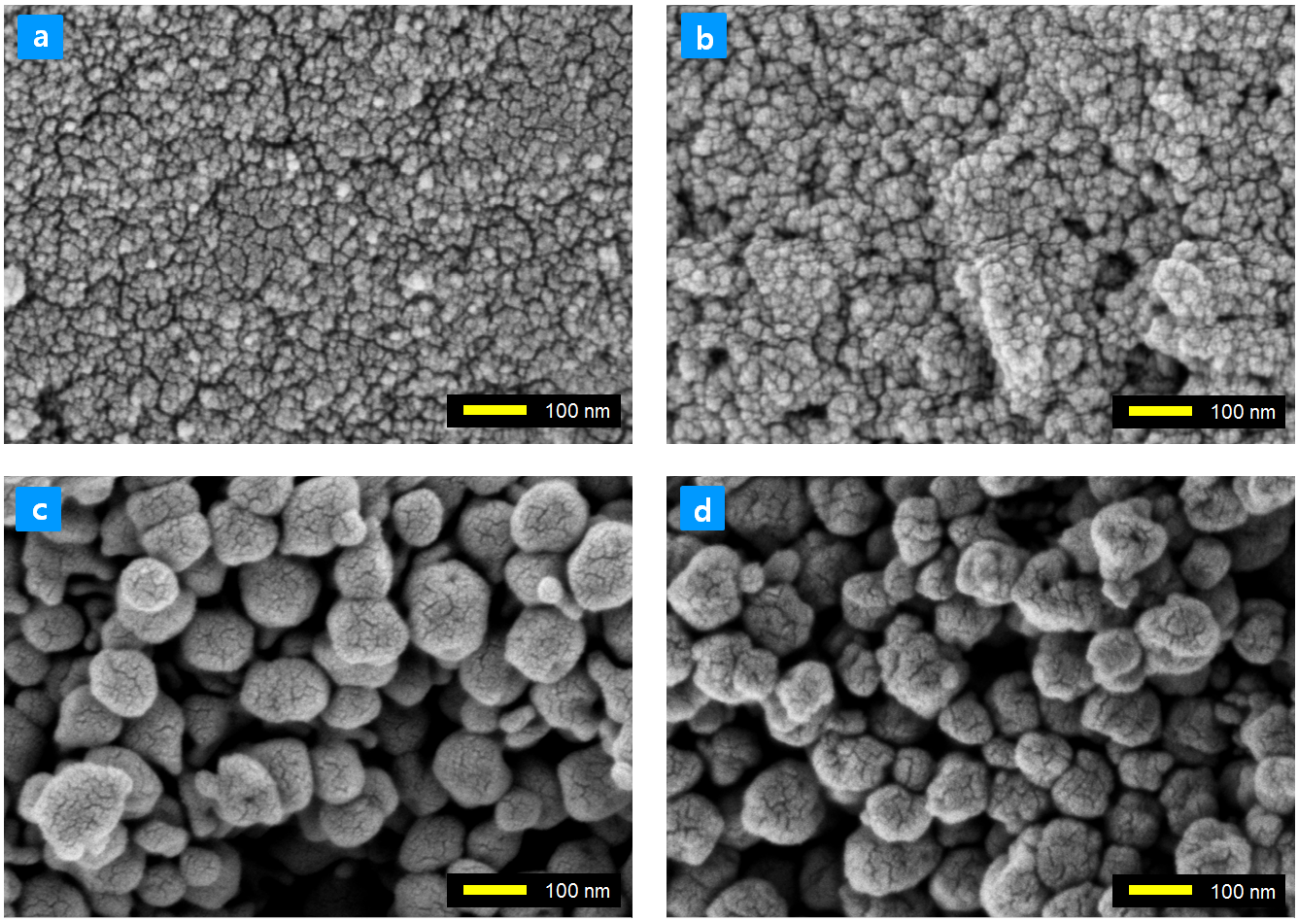

Fig. S8 FE-SEM images of (a, c) $CoFe_2O_4$ and (b, d) $NiFe_2O_4$ at different sodium acetate concentrations; (a, b) high concentration and (c, d) low concentration.

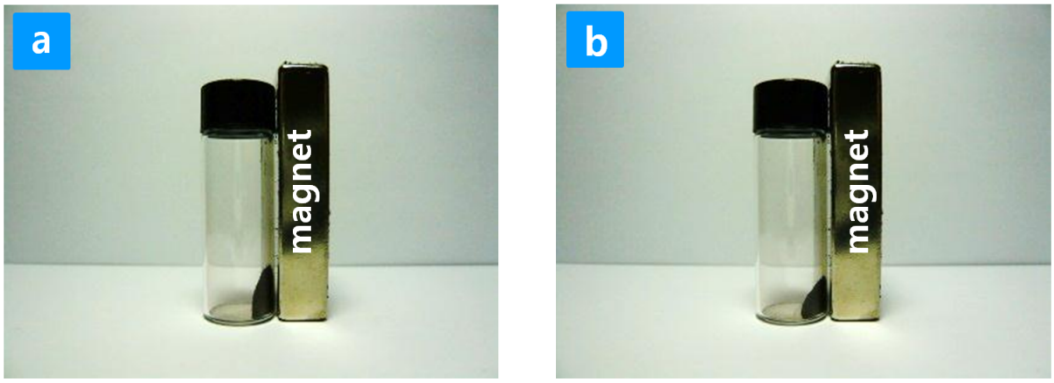

Fig. S9 Photograph of (a) M-$CoFe_2O_4$ and (b) M-$NiFe_2O_4$ particles in the presence of a magnetic field.