Electronic Supplementary Material (ESI) for Dalton Transactions.

Synthesis of carbon embedded MFe_2O_4 (M = Ni, Zn and Co) nano-particles as efficient hydrogenation catalyst

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Table 1 Textural properties of the synthesized materials

Sample	$SA_{BET} m^2g^{-1}$ [a]	V_{tot}/cm^3g^- [1b]	V_{mi}/cm^3g^- [1 c]	$V_{me}/cm^3\ g^-$ [1 d]	D/nm [e]	Crystallite Size (nm)[f]
$NiFe_2O_4$@C	13.2	0.12	0.05	0.07	27.6	36.24
$ZnFe_2O_4$@C	27.2	0.17	0.02	0.15	21.0	15.5
$CoFe_2O_4$@C	39.3	0.18	0.01	0.17	18.9	18.2

[a]BET surface area. [b]total pore volume taken from the volume of N_2 adsorbed at P/P_0 = 0.995. [c]micropore volume calculated from t-plot. [d]mesopore volume calculated by V_{tot}-$V_{mi.}$ [e]BJH adsorption average pore diameter. [f]crystal size measured by Scherrer's equation for the peak 2θ value 30-60.

Table 2 Elemental composition of synthesized materials

Sample	C(wt%)		Fe (wt%)[a]	Ni(wt%)[a]	Zn(wt%)[a]	Co(wt%)[a]
	EDX	CHNS				
$NiFe_2O_4$@C[b]	37.02	24.25	21.08	38.70	0	0
$NiFe_2O_4$@C[c]	35.05	23.15	20.70	36.00	0	0
$ZnFe_2O_4$@C[b]	31.72	23.04	28.03	0	37.77	0
$CoFe_2O_4$@C[b]	30.02	25.09	26.38	0	0	37.85
NiFe2O4@C[d]	-	-	0	0	0	0

[a]Metal % determined by ICP-AES. [b]Fresh catalyst. [b]Catalyst after 4th cycle. [d]ICP-AES analysis using hot filtration after reaction.

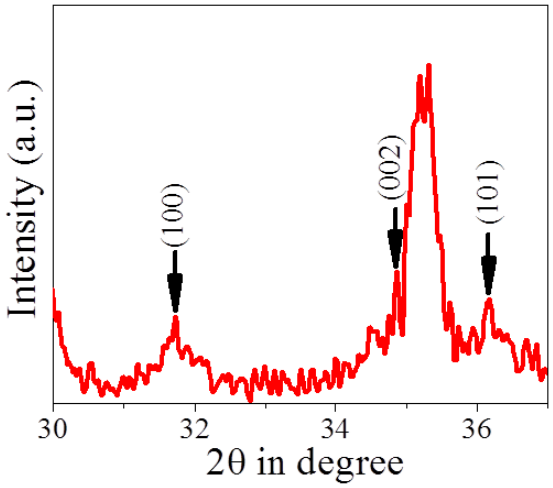

Fig. S1 Enlarged XRD spectra of $ZnFe_2O_4$@C nano-particles showing ZnO phase impurity.

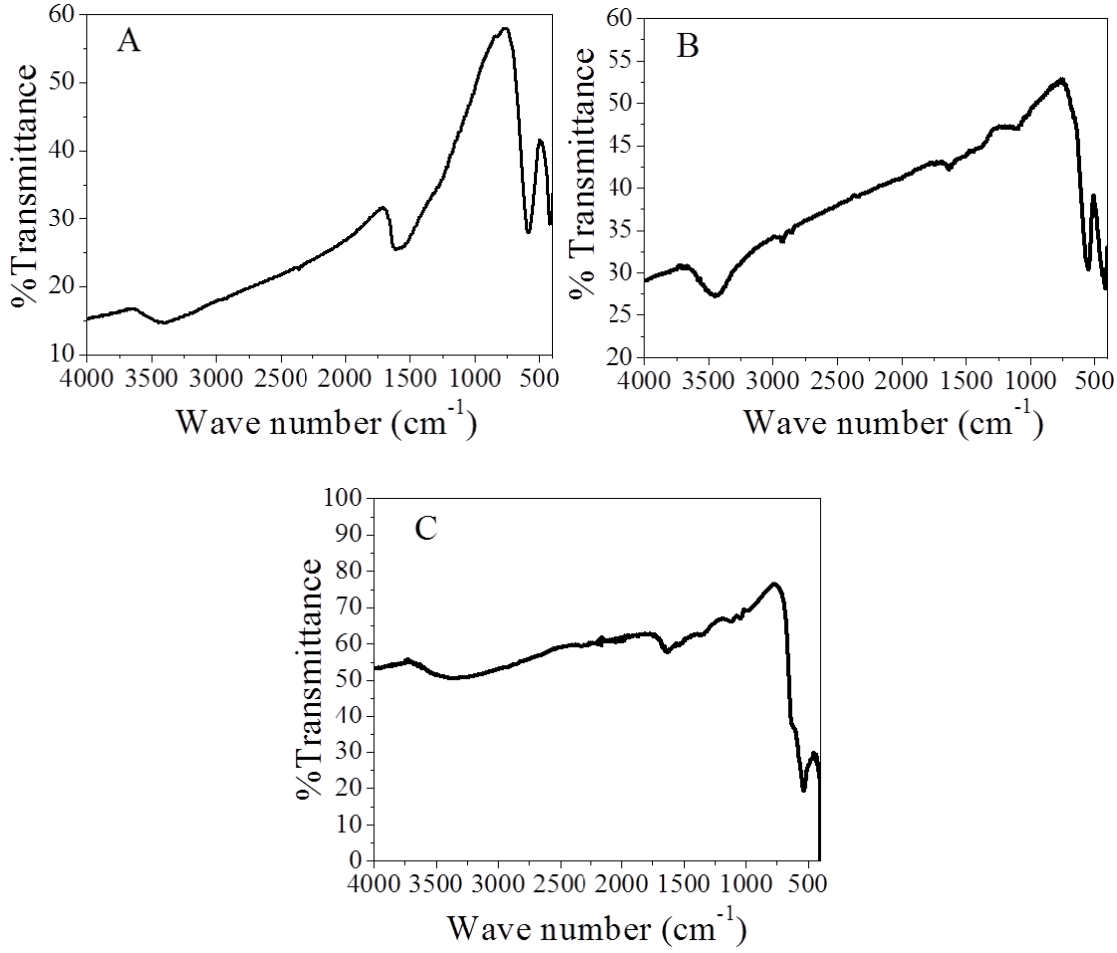

Fig. S2 (A) FT-IR spectra of $NiFe_2O_4$@C nano-particles, (B) FT-IR spectra of $ZnFe_2O_4$@C nano-particles and (C) FT-IR spectra of $CoFe_2O_4$@C nano-particles

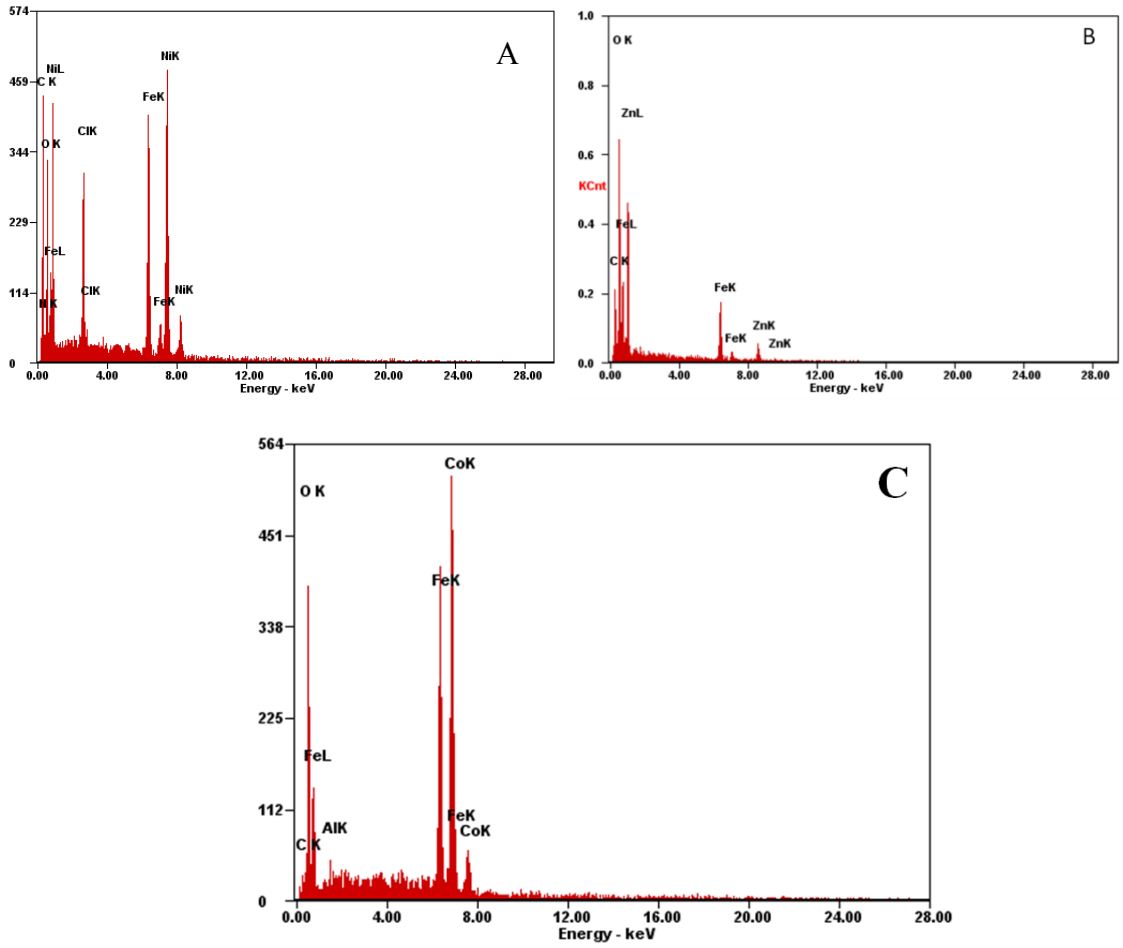

Fig. S3 (A) EDX spectra of $NiFe_2O_4$@C nano-particles, (B) EDX spectra of $ZnFe_2O_4$@C nano-particle and (C) EDX spectra of $CoFe_2O_4$@C nano-particles

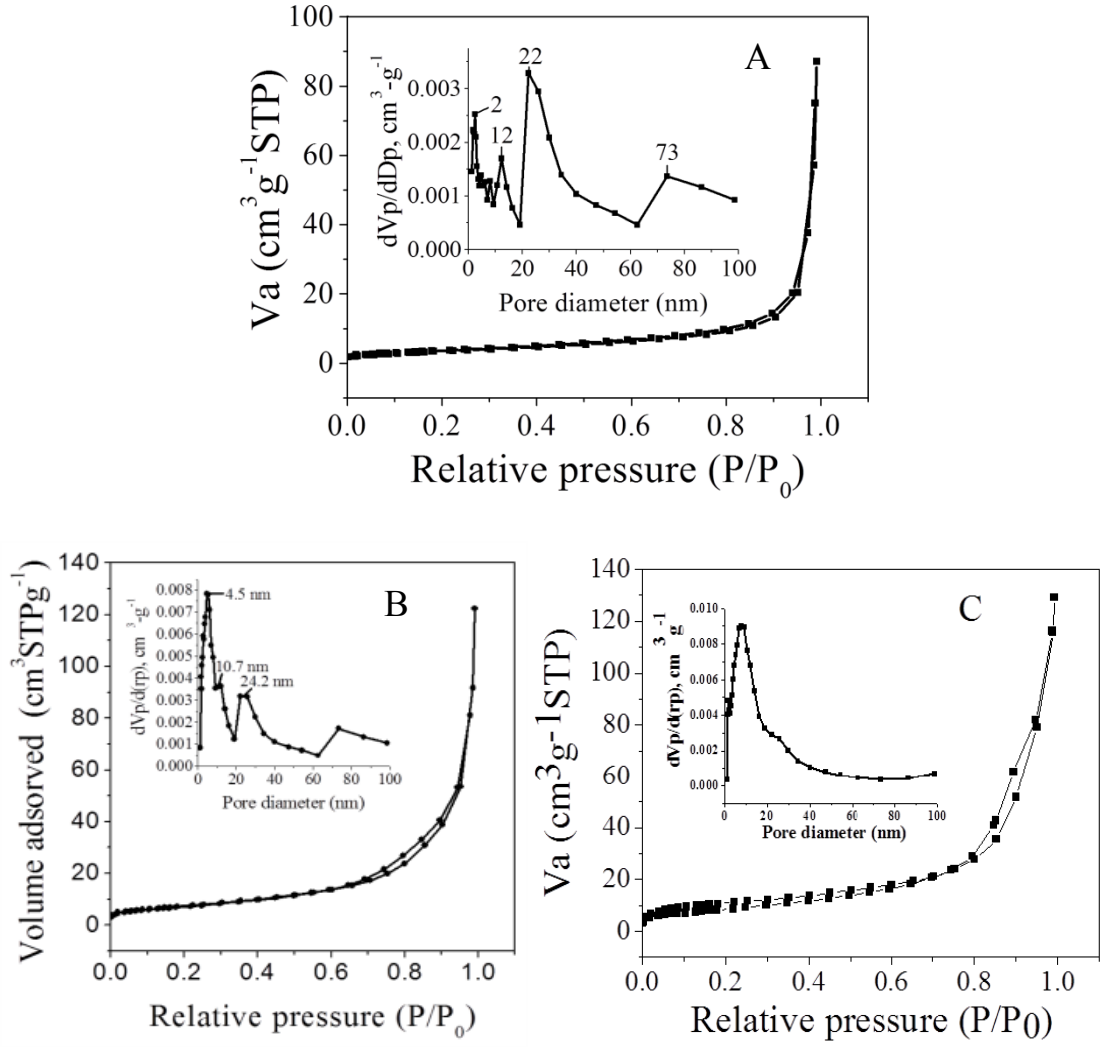

Fig. S4 N_2 adsorption desorption isotherm and respective pore size distribution (inset) of MFe_2O_4 nano-particles @ carbon. (A) $NiFe_2O_4$@C (B) $ZnFe_2O_4$@Cand (C) $CoFe_2O_4$@C.

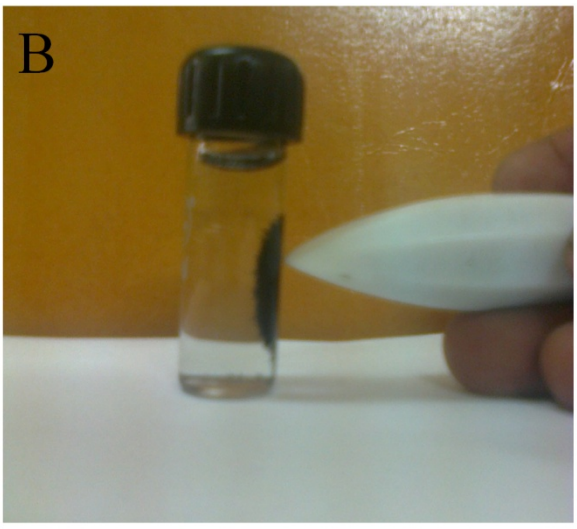

Fig. S5 Photo of magnetic separation of $NiFe_2O_4$ nano-particle @C.