Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Preparation and characterization of magnetic nanocomposite catalysts with double Au nanoparticle layers

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Table S1 Kinetic constants (*k*) and turnover frequencies (TOF) for the reduction of p-nitrophenol by nanocomposites

Catalyst	Au (wt%)	Ag (wt%)	*k* (min^{-1})	TOF (h^{-1})
Fe_3O_4@SiO_2-Au	11.80	-	0.20	18.75
Fe_3O_4@SiO_2-Au@mSiO_2	3.10	-	0.10	38.22
Fe_3O_4@SiO_2-Au@mSiO_2-Au	15.30	-	0.53	33.71
Fe_3O_4@SiO_2-Au@mSiO_2-Ag	3.40	4.10	0.95	81.52

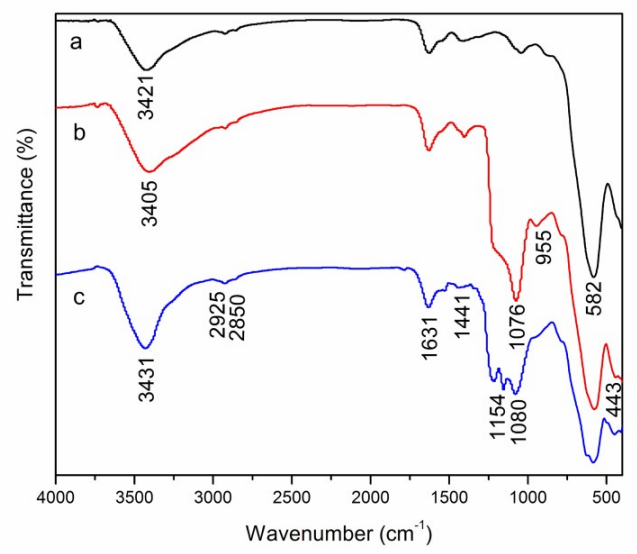


Fig. S1 FT-IR spectra of (a) Fe_3O_4, (b) Fe_3O_4@SiO_2, and (c) APTES-Fe_3O_4@SiO_2

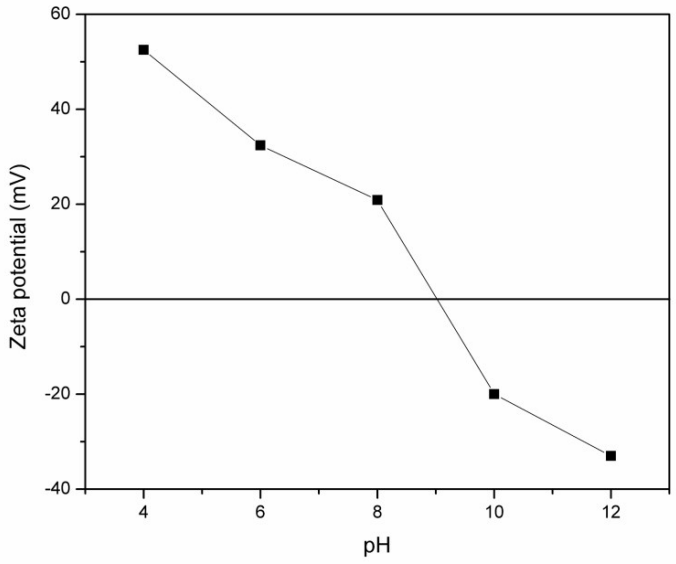


Fig. S2 Zeta potential of Fe_3O_4@SiO_2-NH_2 nanoparticles at different pH values indicating the presence of amine groups resuting positvively charged nanoparticles.

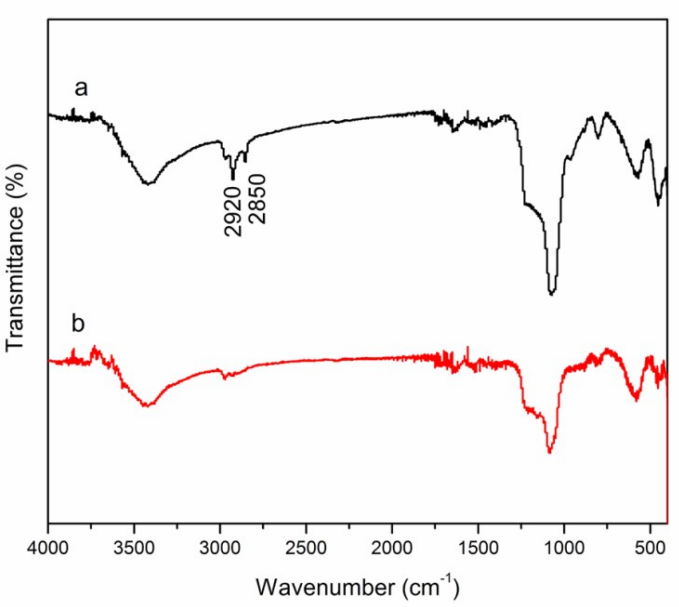


Fig. S3 FT-IR spectra of (a) nanocomposties before CTAB extraction and (b) after CTAB extraction by refluxing with acetone.

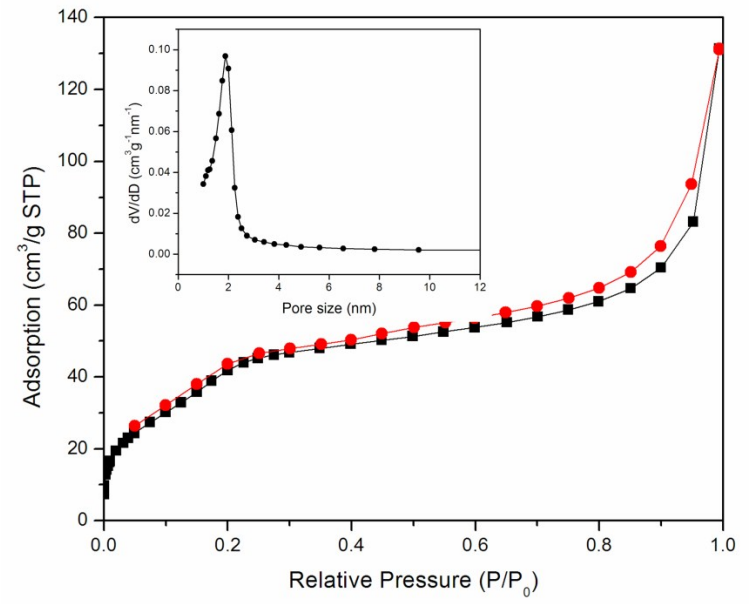


Fig. S4 N_2 adsorption-desorption isotherms and pore size distribution (inset) of Fe_3O_4@SiO_2-Au@mSiO_2 after CTAB extraction.

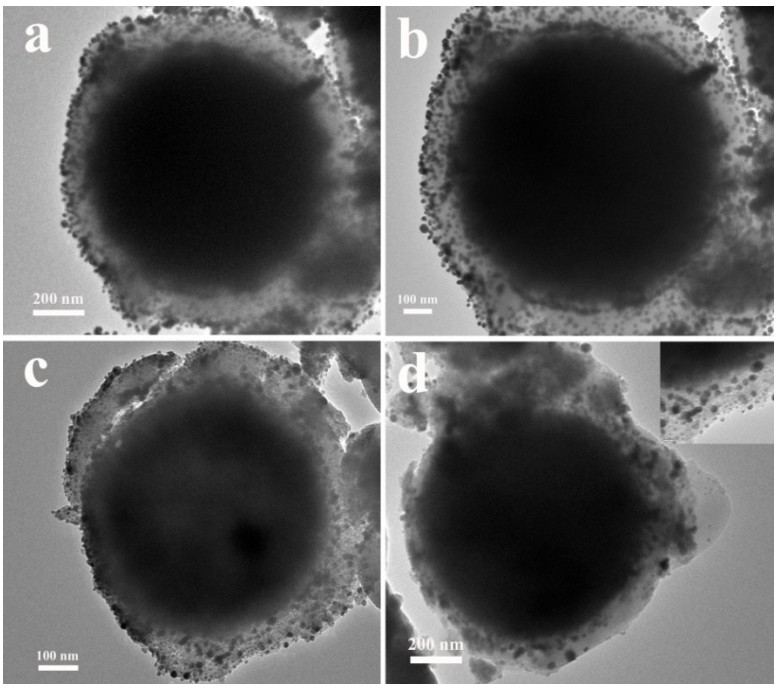


Fig. S5 TEM of (a, b) Fe_3O_4@SiO_2-Au@mSiO_2-Au and (c, d) Fe_3O_4@SiO_2-Au@mSiO_2-Ag. Inset of d shows Ag nanoparticles on the outer silica surface.

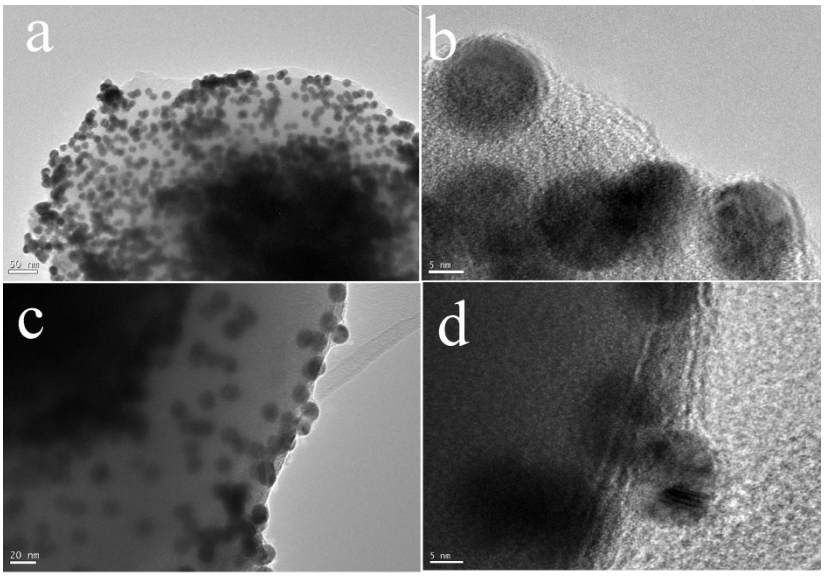


Fig. S6 HRTEM of (a, b) Fe_3O_4@SiO_2-Au@mSiO_2-Au and (c, d) Fe_3O_4@SiO_2-Au@mSiO_2-Ag.

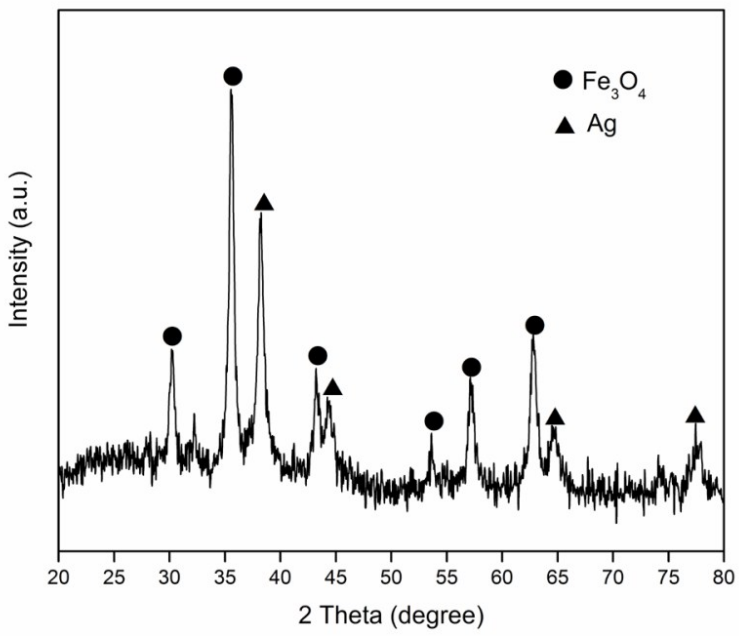
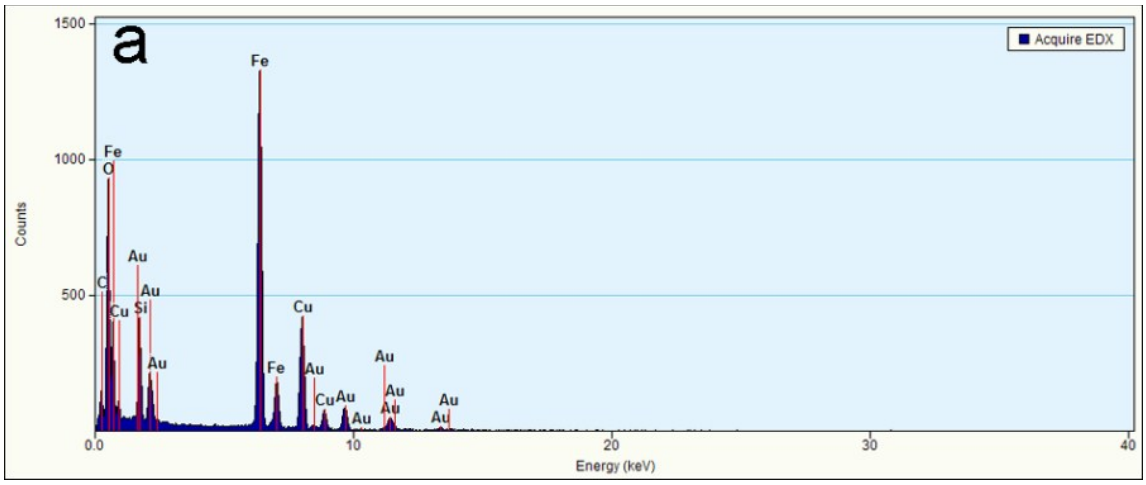
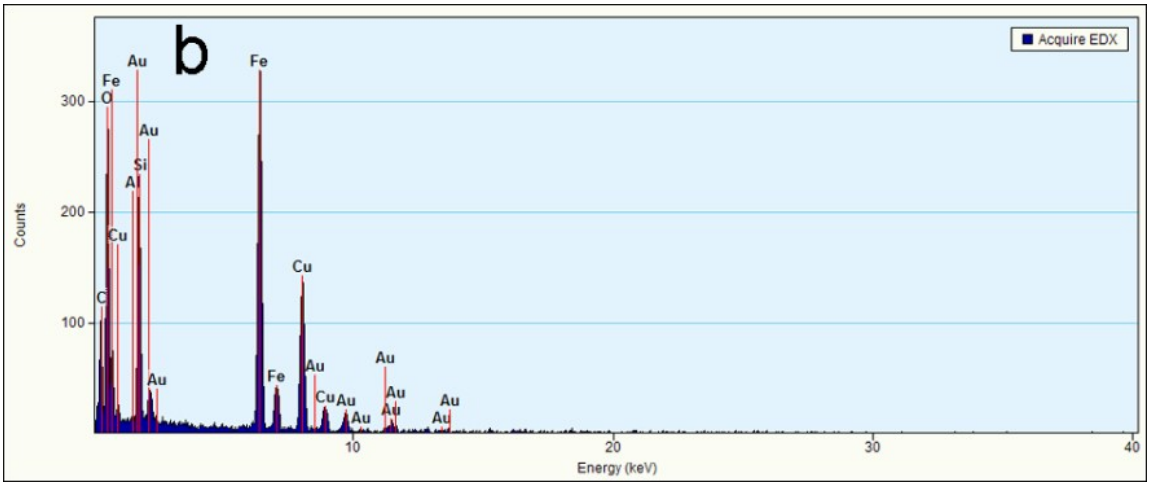
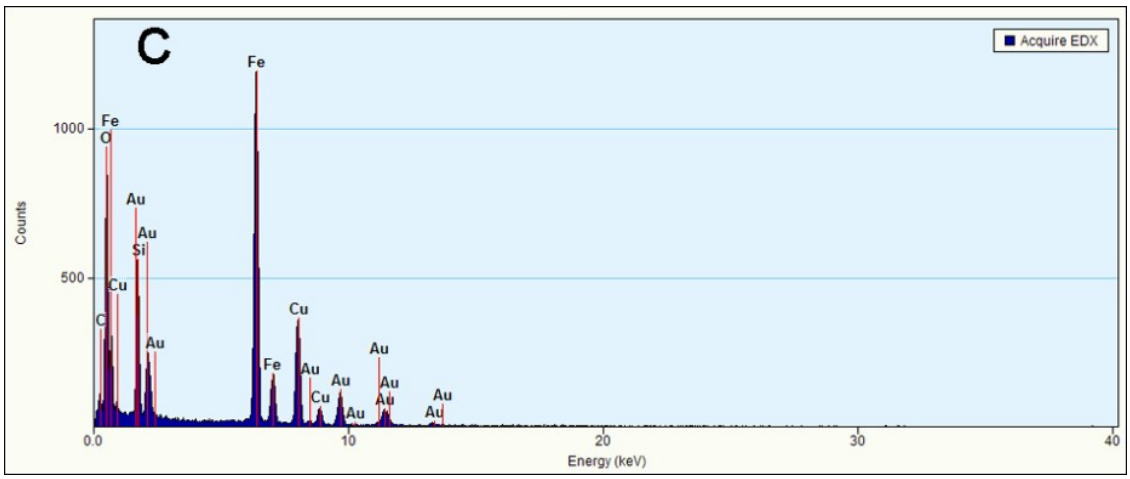


Fig. S7 The wide angle XRD patterns of Fe_3O_4@SiO_2-Au@mSiO_2-Ag


a
Acquire EDX
Counts
Energy (keV)
Fe
O
C
Cu
Au
Si


b
Acquire EDX
Counts
Energy (keV)
Fe
O
C
Cu
Au
Si


c
Acquire EDX
Counts
Energy (keV)
Fe
O
C
Cu
Au
Si

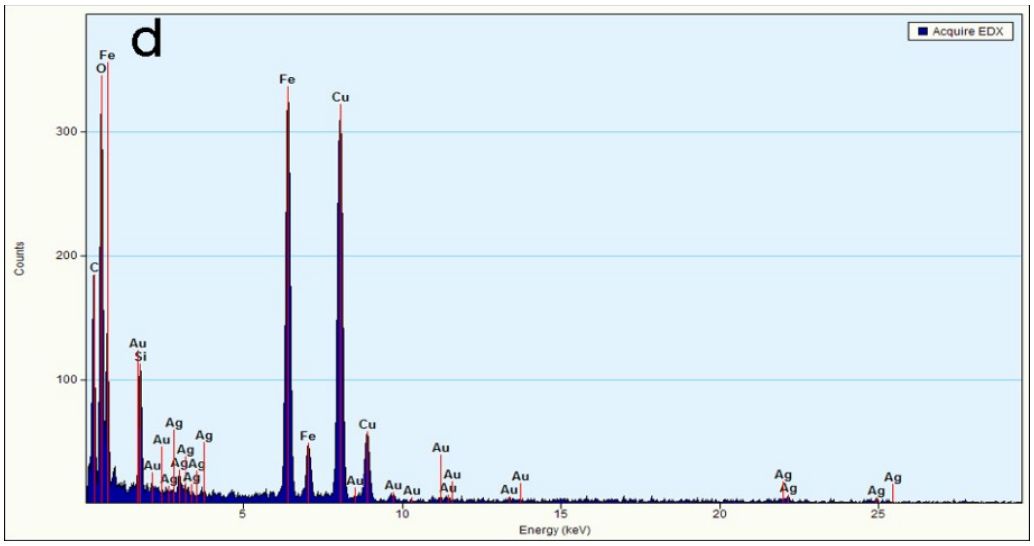


Fig. S8 EDX spectra of (a) Fe_3O_4@SiO_2-Au, (b) Fe_3O_4@SiO_2-Au@mSiO_2, (c) Fe_3O_4@SiO_2-Au@mSiO_2-Au, and (d) Fe_3O_4@SiO_2-Au@mSiO_2-Ag indicating the presence of elements in the nanocomposites.

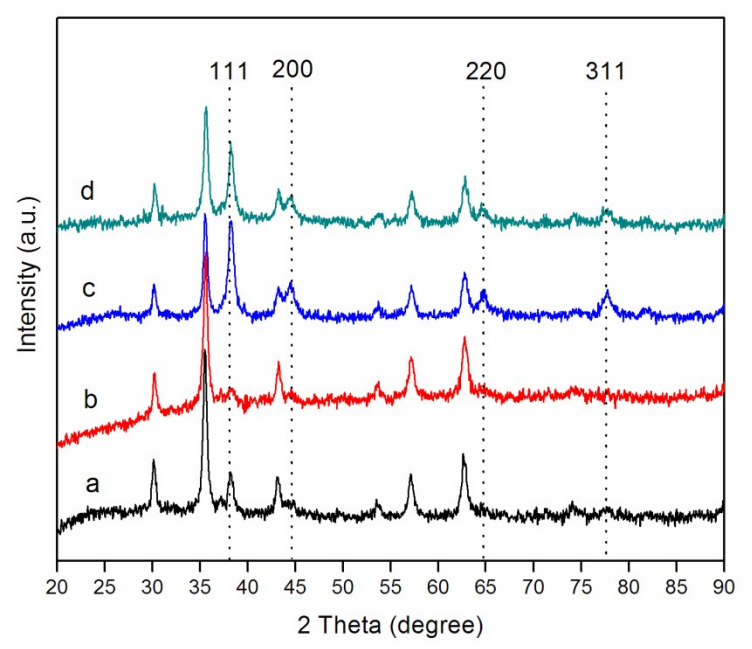


Fig. S9 The wide angle XRD patterns of (a) Fe_3O_4@SiO_2-Au, (b) Fe_3O_4@SiO_2-Au@mSiO_2, (c) Fe_3O_4@SiO_2-Au@mSiO_2-Au, and (d) Fe_3O_4@SiO_2-Au@mSiO_2-Ag after using for 6 cycles.