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Organophosphonate-functionalized nanosized magnetic iron oxides as sorbents for heavy metal cations

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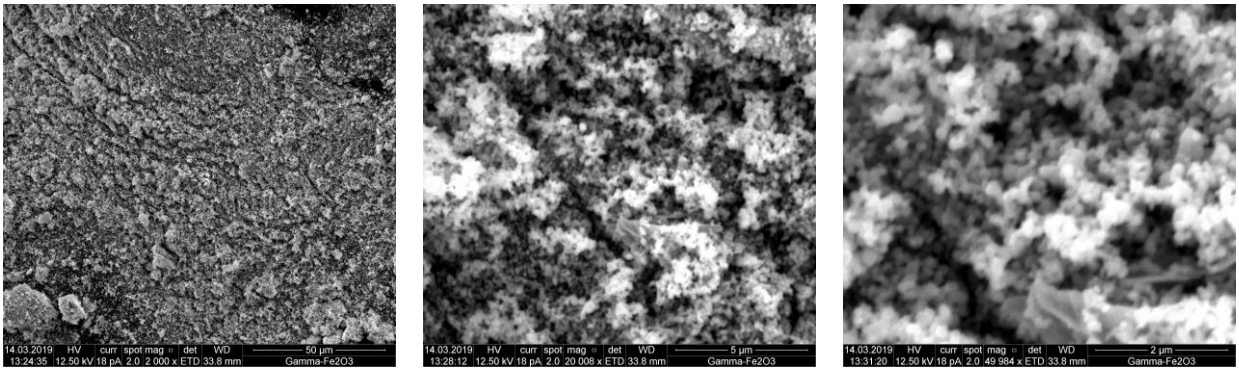

Figure S1 SEM images of γ-Fe_2O_3 particles at different magnifications. Morphological studies of particles were performed using a scanning electron microscope INSPECT S50 with accelerating voltage of 12.5 kV.

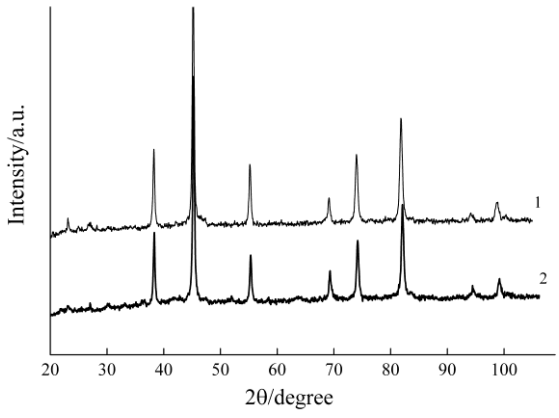

Figure S2 X-ray diffraction spectra of Fe_3O_4 (*1*) and γ-Fe_2O_3 (*2*) recorded on a DRON 6 X-ray diffractometer with Fe- K_α sourse (λ = 0.19360 nm).

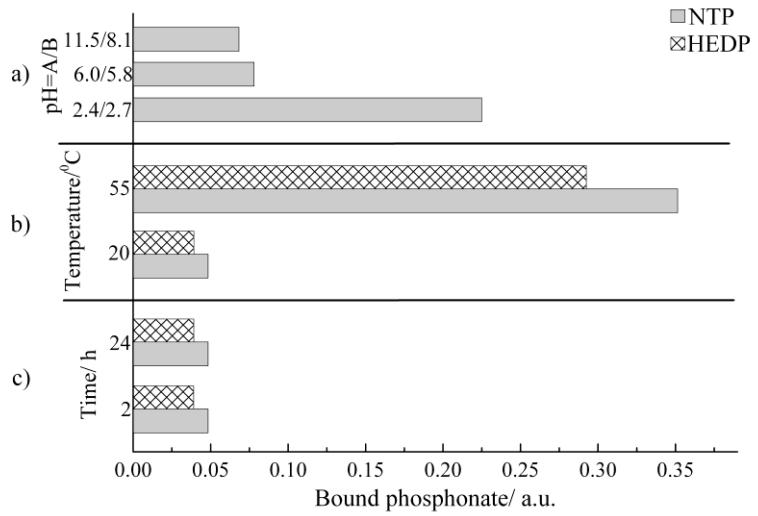

Figure S3 The influence of experimental conditions on the amount of phosphonates on γ-Fe_2O_3 surface:
a) pH of phosphonate solution (t = 20°C, τ = 2 h, pH = A/B, A is I nitial and B is final);
b) modification temperature (τ = 2 h, pH = 1.5–2.5);
c) modification time (pH = 1.5–2.5, t = 20 °C)

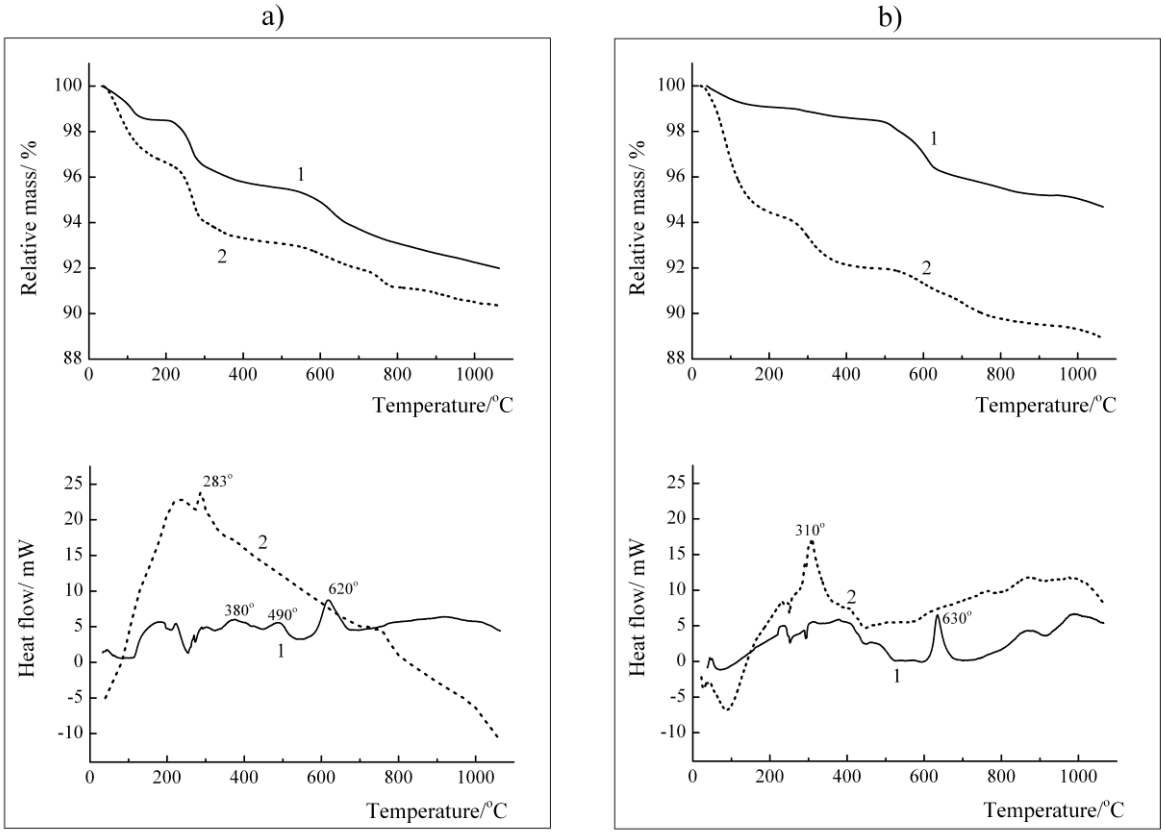

Figure S4 Curves of thermal analysis: (*a*) Fe_3O_4 (*1*), HEDP- Fe_3O_4 (*2*) and (*b*) γ-Fe_2O_3 (*1*), NTP- γ-Fe_2O_3 (*2*).

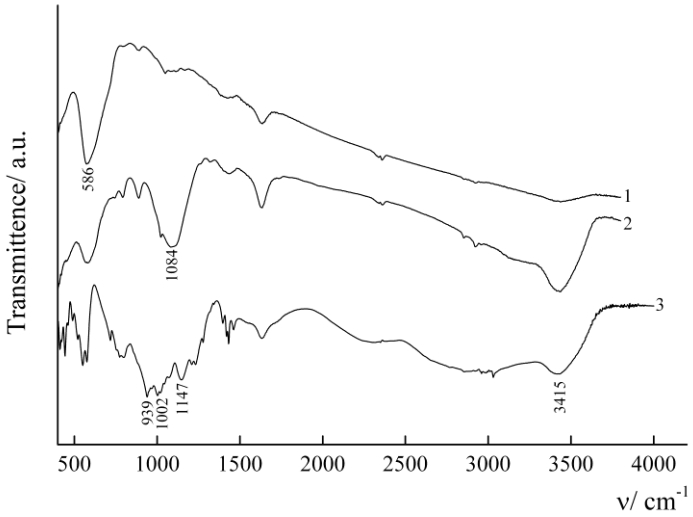

Figure S5 FTIR spectra of Fe_3O_4 (*1*), NTP- Fe_3O_4 (*2*) and NTP (*3*).

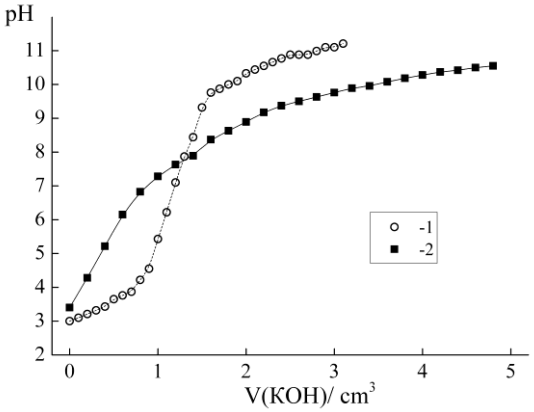

Figure S6 Acid-base titration curves of γ-Fe_2O_3 (*1*) and NTP- γ-Fe_2O_3 (*2*). $C_{sorbent}$ = 10 g dm^{-3}, C_{KOH} = 0.1 mol dm^{-3}.

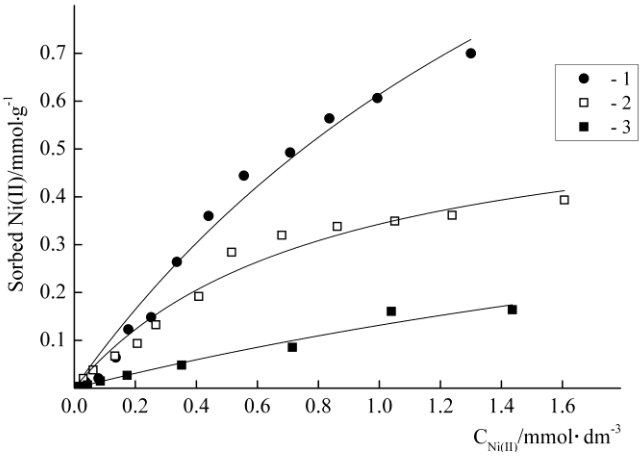

Figure S7 Sorption isotherms of Ni^{II} onto Fe_3O_4 (*1*), HEDP- Fe_3O_4 (*2*), and NTP- Fe_3O_4 (*3*).
$C_{sorbent}$ = 1 g dm^{-3}, pH = 4–5.