

## SUPPLEMENTARY FILE

### Thermogravimetric analysis

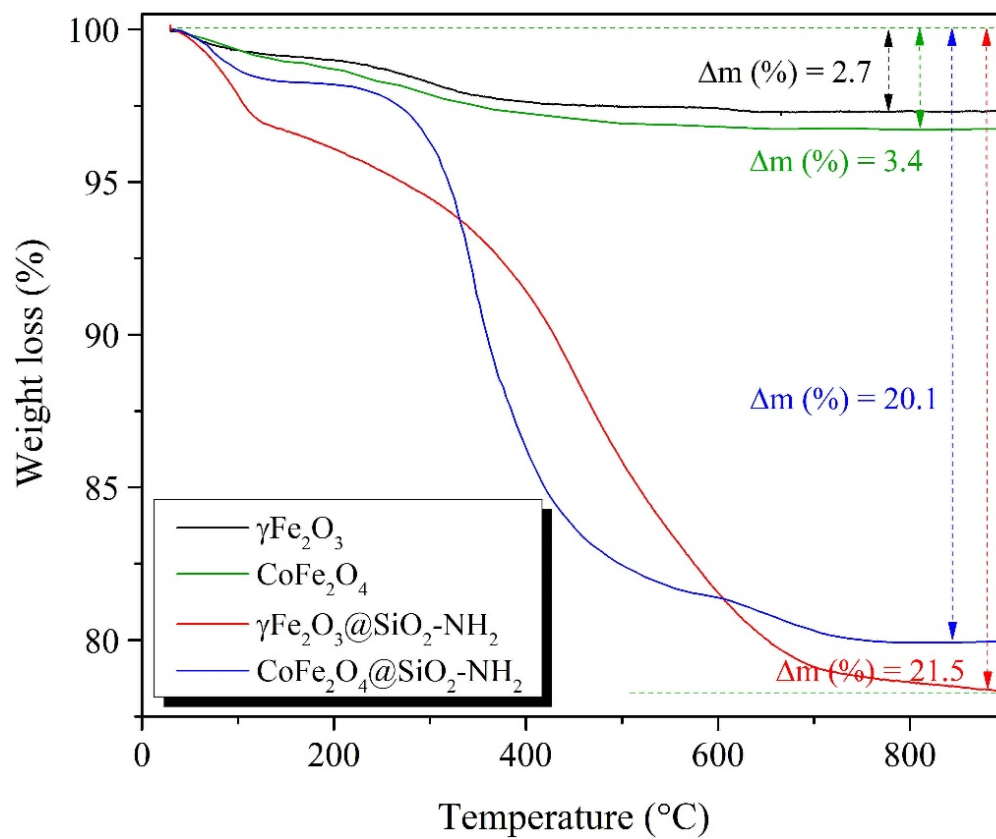


Figure S1. Thermogravimetric analysis of the prepared  $\gamma\text{Fe}_2\text{O}_3$ ,  $\text{CoFe}_2\text{O}_4$ ,  $\gamma\text{Fe}_2\text{O}_3@\text{SiO}_2\text{-NH}_2$ , and  $\text{CoFe}_2\text{O}_4@\text{SiO}_2\text{-NH}_2$  NPs.

## Potentiometric titration

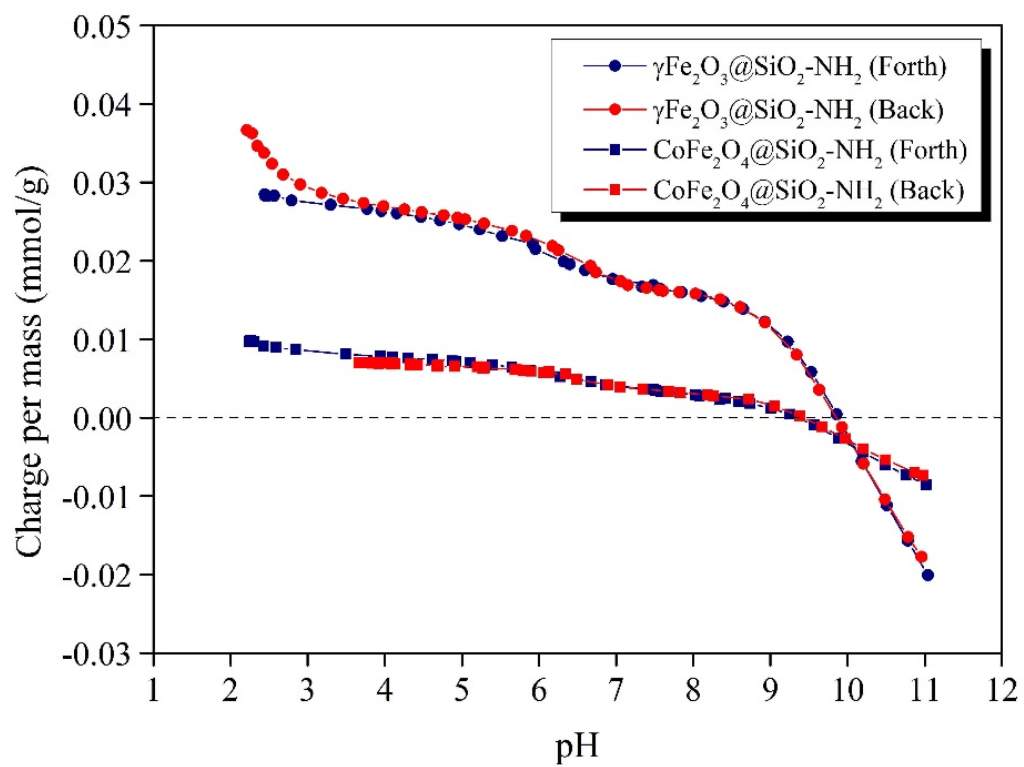


Figure S2. Potentiometric charge titration isotherms as a function of pH for  $\gamma\text{Fe}_2\text{O}_3@\text{SiO}_2\text{-NH}_2$  and  $\text{CoFe}_2\text{O}_4@\text{SiO}_2\text{-NH}_2$  NPs

Table S1. List of various adsorbent materials with their toxicological assessment in biological systems.

Assay	NM(s)	Model	Organ/tissue	Exposure	Dose range	Toxicity	Ref.
In vitro	Magnetic, SiO <sub>2</sub> -coated	HEK293 (human)	Kidney	12 h	Up to 1.0 µg/µL	Toxic	[143]
In vitro	SiO <sub>2</sub>	A549 (human)	Lung	24 h	0.1 to 6 µg/cm <sup>2</sup>	Toxic	[144]
In vivo	MWCNT	Rat	Lung	6 h (aerosol) + 90-day post-exposure period	11 mg/m <sup>3</sup>	Toxic	[145]
In vivo	TiO <sub>2</sub> (anatase) and hydroxylated fullerenes	Danio rerio (embryo)	Whole-organism Microinjection	48 h incubation	40 µg/mL fullerenes and 170 ng/mL	Toxic	[146]
In vitro	Ag	CaCo-2 (human)	Colon	24 h	2.5 and 25 µg/mL	Toxic	[147]
In vitro	Au, functionalised with anti-sense cDNAs	HCT-116 (human)	Colon	48 h	Equivalent to 30 nM of cDNAs	Toxic	[148]
In vitro	γFe <sub>2</sub> O <sub>3</sub> @SiO <sub>2</sub> -NH <sub>2</sub>	Human	Human skeletal muscles derived cells (SKMDCs), human fibroblasts, murine macrophage cells (RAW264.7), and human umbilical vein	4 h	0.5 mg mL <sup>-1</sup> of 3-(4,5- dimethylthiazol-2-yl)-2,5- diphenyltetrazoliumbromide (MTT)	Non-toxic	This work

			endothelial cells (HUVECs)				
In vitro	CoFe <sub>2</sub> O <sub>4</sub> @SiO <sub>2</sub> - NH <sub>2</sub>	Human	Human skeletal muscles derived cells (SKMDCs), human fibroblasts, murine macrophage cells (RAW264.7), and human umbilical vein endothelial cells (HUVECs)	4 h	0.5 mg mL <sup>-1</sup> of 3-(4,5- dimethylthiazol-2-yl)-2,5- diphenyltetrazoliumbromide (MTT)	Non- toxic	This work
In vivo	γFe <sub>2</sub> O <sub>3</sub> @SiO <sub>2</sub> - NH <sub>2</sub>	Zebrafish (Embryos)	Wild-type AB zebrafish embryos	7 h	0, 10, 50, 125, and 500 mg/L	Non- toxic	This work
In vivo	CoFe <sub>2</sub> O <sub>4</sub> @SiO <sub>2</sub> - NH <sub>2</sub>	Zebrafish (Embryos)	Wild-type AB zebrafish embryos	7 h	0, 10, 50, 125, and 500 mg/L	Non- toxic	This work

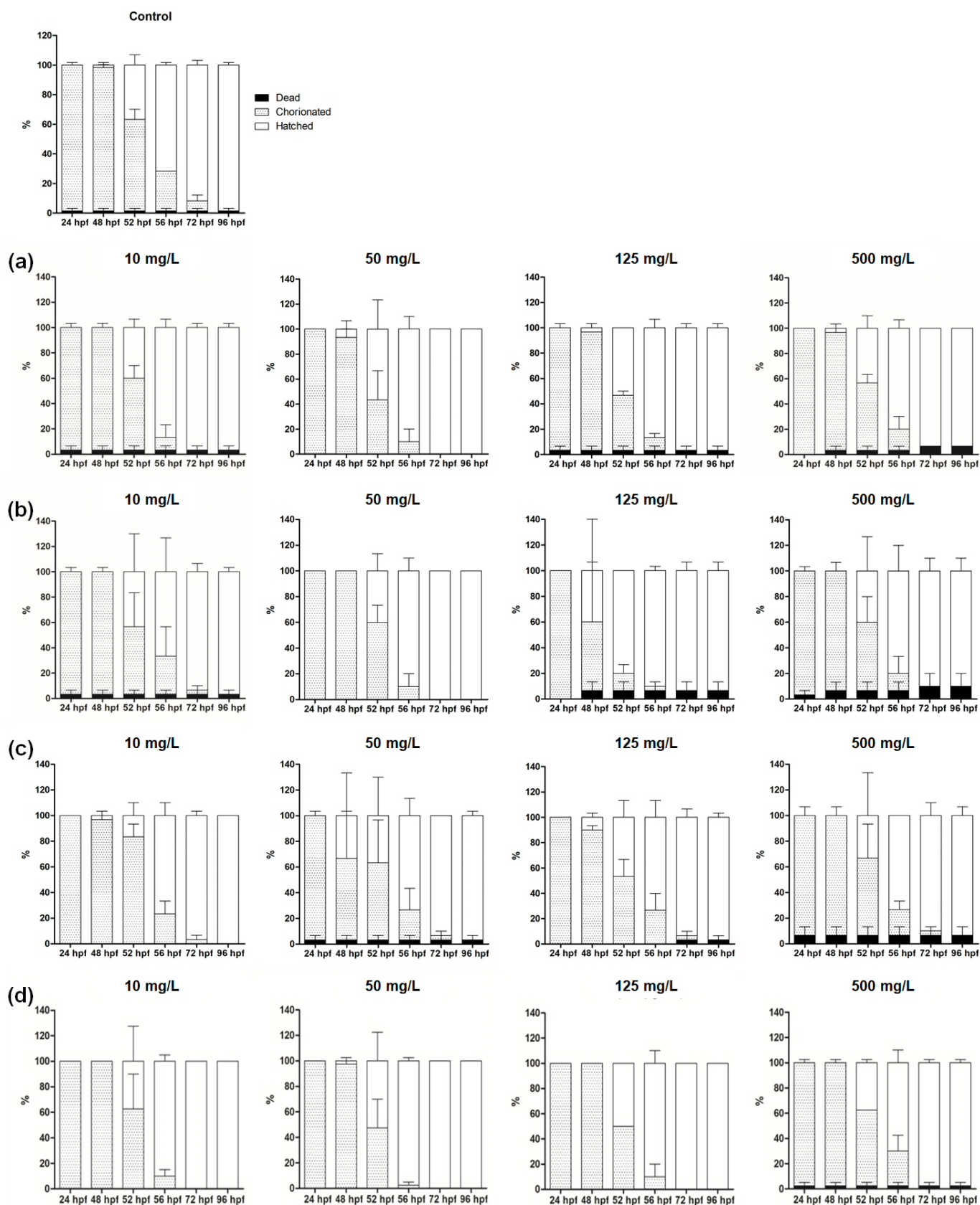


Figure S3. Zebrafish embryo development expressed as percentages of dead, chorionated, and hatched, in water containing different concentrations of nanoparticles (a)  $\gamma\text{Fe}_2\text{O}_3$  (b)  $\gamma\text{Fe}_2\text{O}_3@\text{SiO}_2\text{-NH}_2$  (c)  $\text{CoFe}_2\text{O}_4$ , and (d)

CoFe<sub>2</sub>O<sub>4</sub>@SiO<sub>2</sub>-NH<sub>2</sub> for 24, 48, 52, 56, 72, and 96 hours post fertilization (hpf). Data are presented as mean ± SEM of two independent experiments.