

Supplementary Information

Effects of Surface Functionality of Carbon Nanomaterials on Short-Term Cytotoxicity and Embryonic Development in Zebrafish

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R = COOH, OH, NH₂, Ph

F = Fluorescence moiety (Methacryloxyethyl thiocarbonyl rhodamine-B)

BPO = Benzoyl Peroxide

x, y = the number of repeat unit in polymer

m = the number of polymer attached on the surface of Fe@CNPs/NDs

x, y, m are variable number

Figure S1 Schematic process for surface functionalization of carbon nanomaterials.

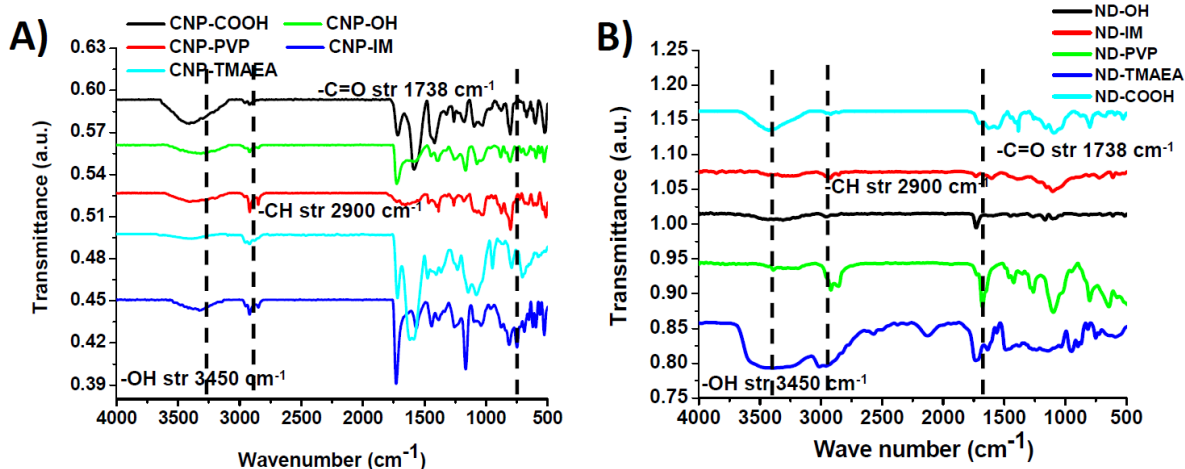


Figure S2. FT-IR spectra for various surface functionalized A) Fe@CNPs and B) NDs.

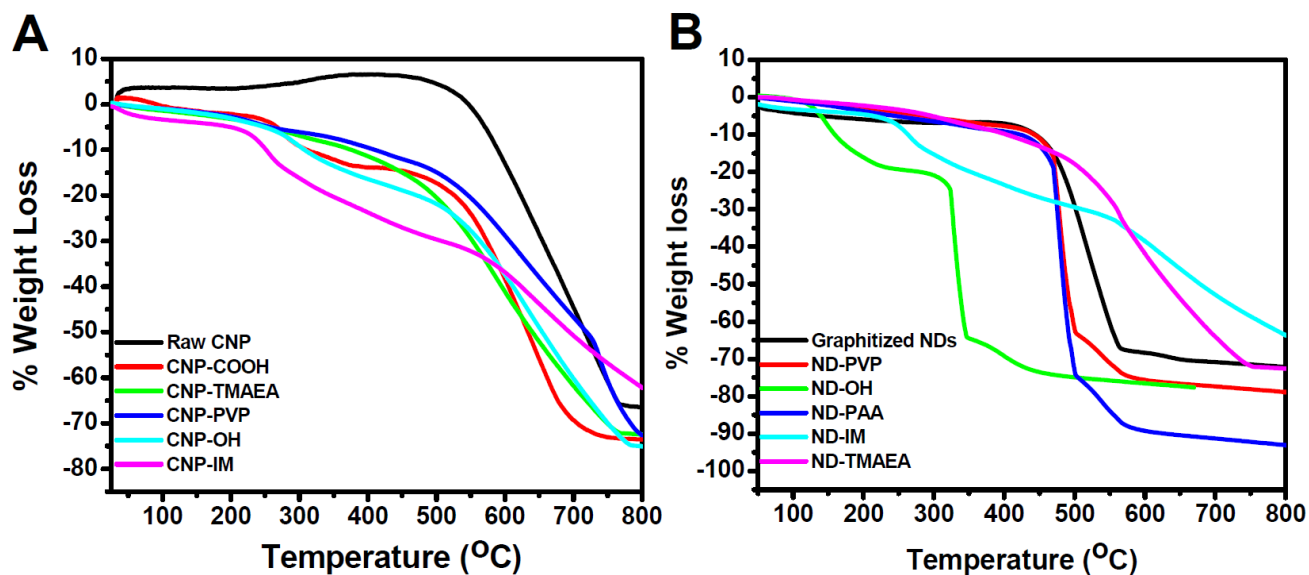


Figure S3. Thermogravimetric analyses of surface functionalized A) Fe@CNPs and B) NDs.

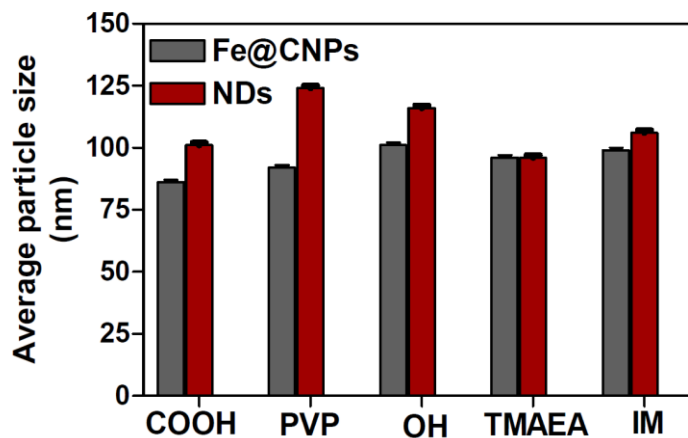


Figure S4. Dynamic light scattering (DLS) measurements for various surface-functionalized Fe@CNPs and NDs dispersed in DI water.

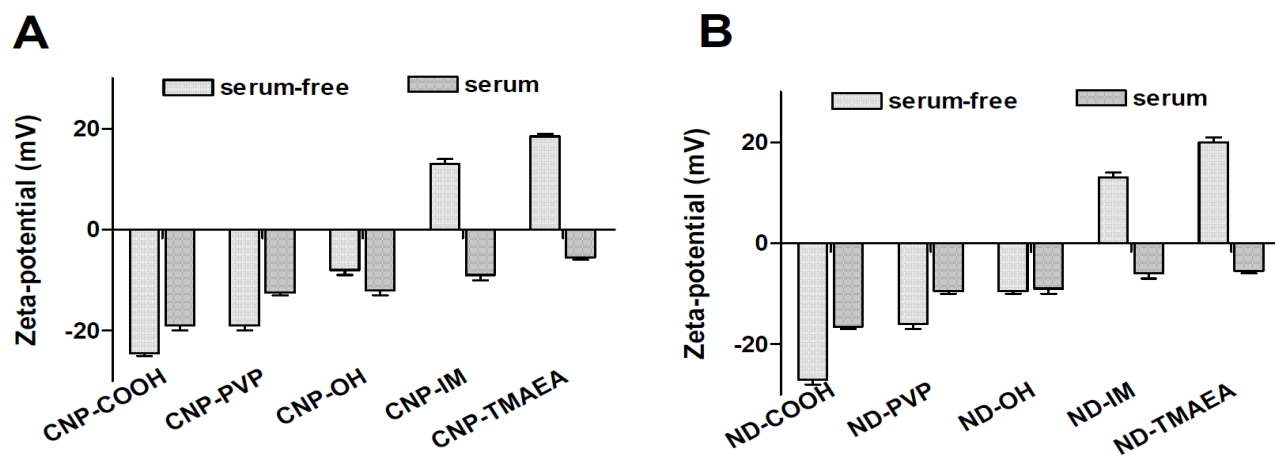


Figure S5. Zeta-potential values for various surface functionalized Fe@CNPs and NDs in the presence of serum and serum-free media.

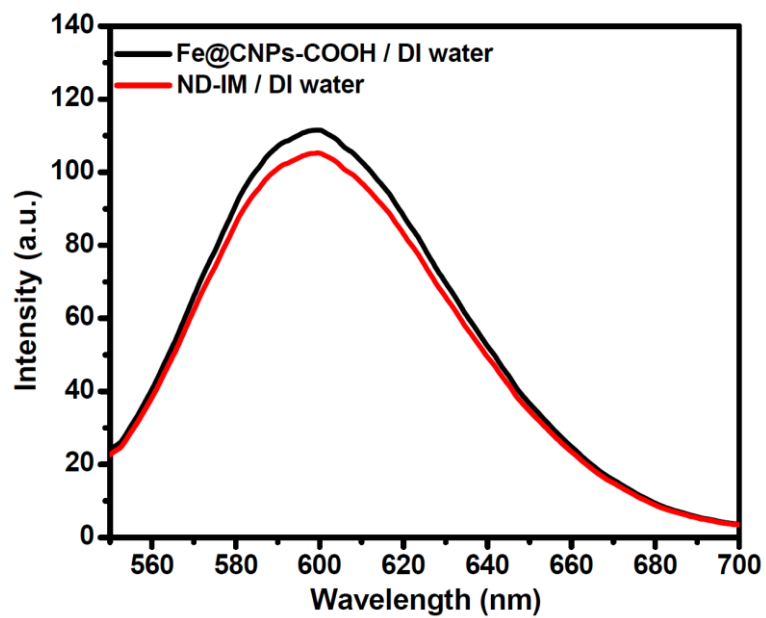


Figure S6. Photoluminescence (PL) spectra for Fe@CNPs-COOH and ND-IM conjugated with DR1 fluorescent dye. The spectra were recorded in DI water at an excitation wavelength of 488 nm.

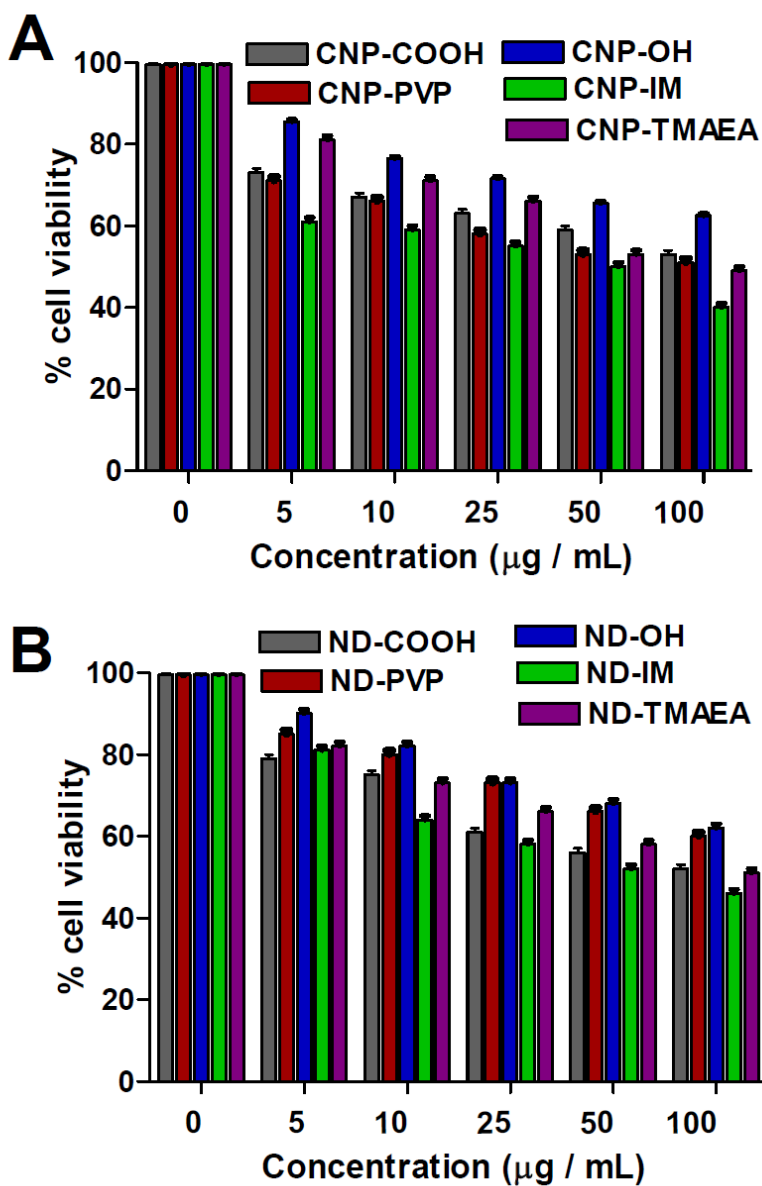


Figure S7. Cell viabilities of U-87MG cells after pretreatment with various surface functionalized (A) Fe@CNPs and (B) NDs respectively.

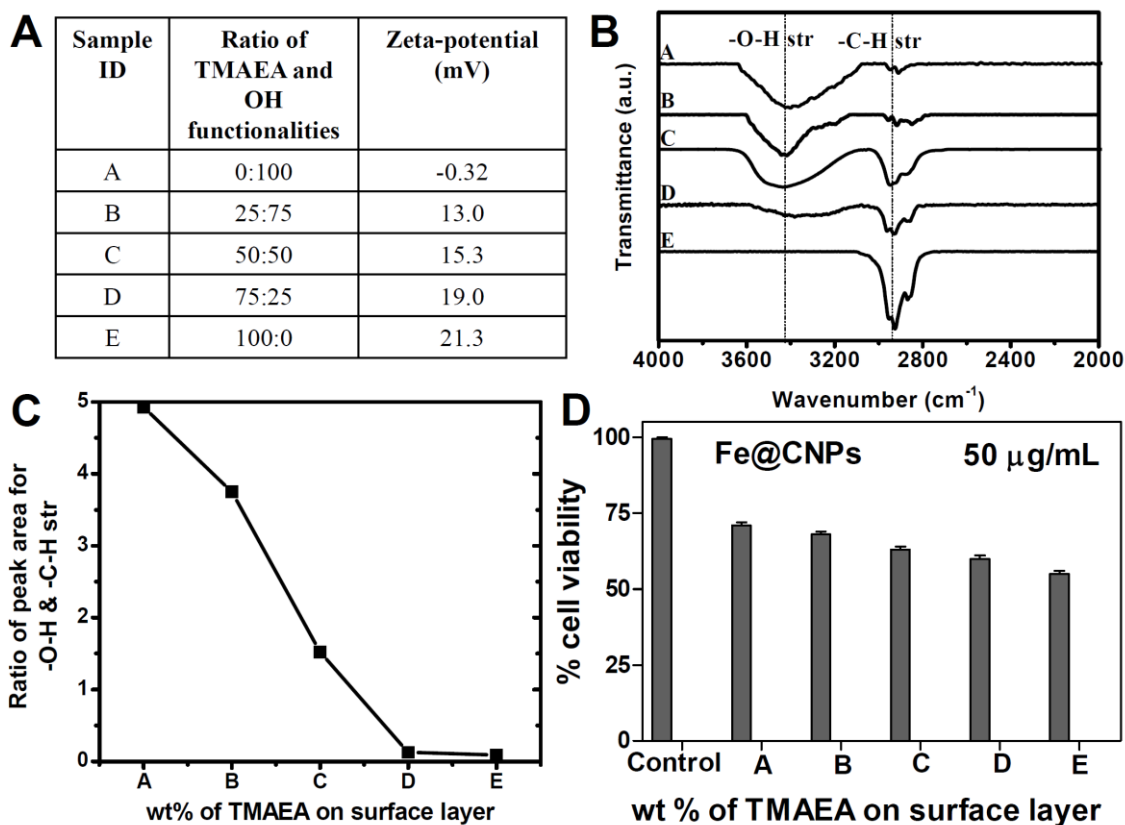


Figure S8. The surface of Fe@CNPs was co-functionalized with trimethyl ammonium ethyl methacrylate (TMAEA) and 2-hydroxy ethyl methacrylate (OH) with different weight ratios as indicated in the table of (A). (A) The weight ratio of TMAEA vs. OH and the zeta-potential values of surface-functionalized Fe@CNPs (B) FT-IR spectra for all the samples, and (C) changes in the ratio of the peak area for –O-H to the –C-H stretching as a function of wt% of TMAEA on surface layer, and (D) HeLa cell viabilities measured using MTT assay for different samples as shown in (A) at 50 µg/mL concentration.

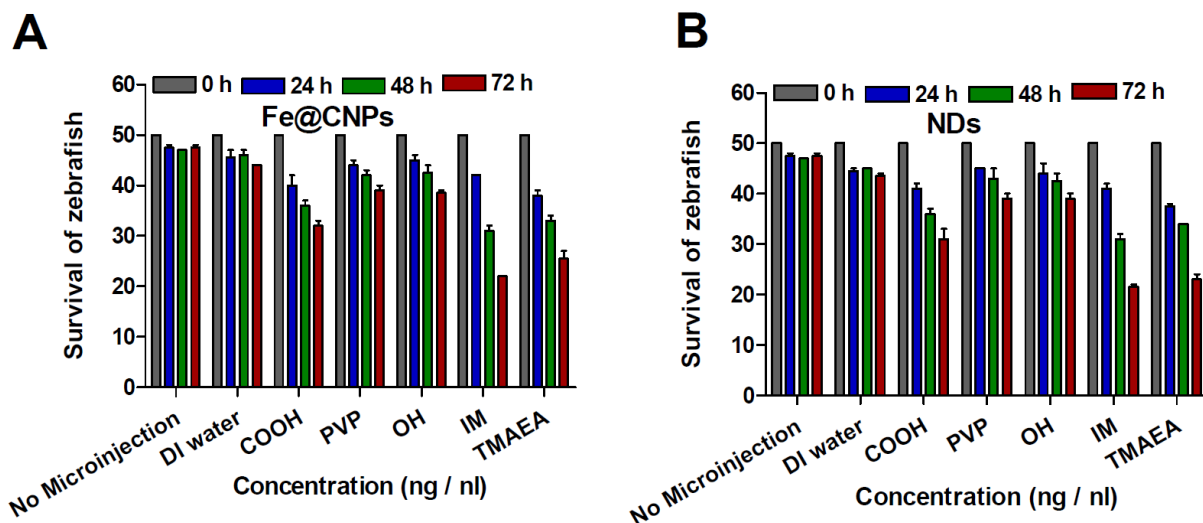


Figure S9. Biocompatibility of various surface functionalized (A) Fe@CNPs and (B) NDs in zebrafish. Survival rates were monitored after microinjection of nanoparticles at different hours post fertilization (hpf). The concentrations of surface functionalized Fe@CNPs and NDs are 0.06 ng /mL.