Electronic Supplementary Material (ESI) for Biomaterials Science.
This journal is © The Royal Society of Chemistry 2015

Electronic Supplementary Information

Facile synthesis of RGD peptide-modified iron oxide nanoparticles with ultrahigh relaxivity for targeted MR imaging of tumors

Yong Hu[a1], Jingchao Li[a1], Jia Yang[b1], Ping Wei[a], Yu Luo[a], Ling Ding[a], Wenjie Sun[a], Guixiang Zhang[b*], Xiangyang Shi[a*], Mingwu Shen[a*]

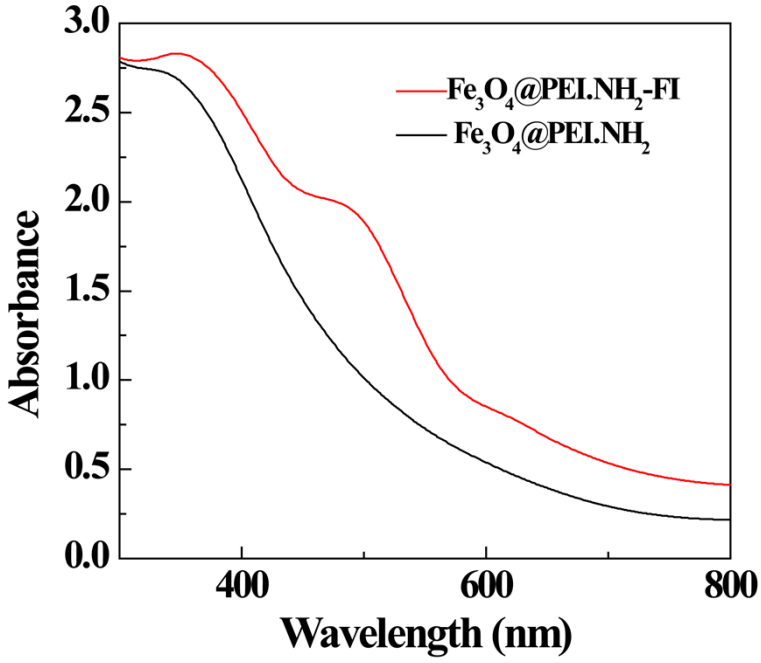

Figure S1. UV-Vis spectra of the Fe_3O_4@PEI.NH_2-FI and Fe_3O_4@PEI.NH_2 NPs dispersed in water.

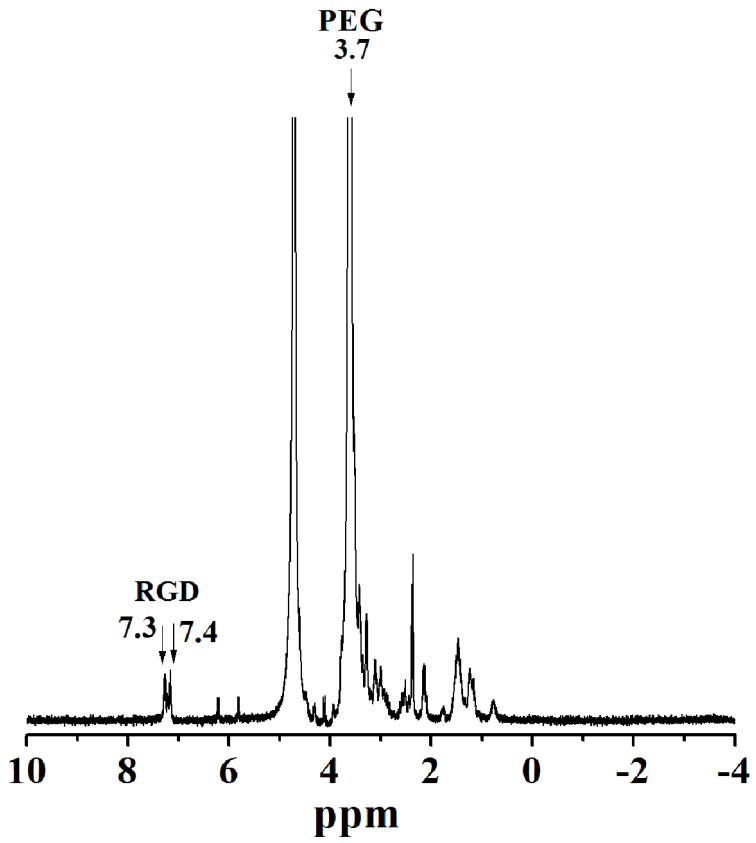

Figure S2. ^{1}H NMR spectrum of RGD-PEG-COOH dissolved in DMSO-d_6. Through the NMR integration of the RGD-associated aromatic proton peaks at 7.3 and 7.4 ppm and the PEG methylene proton at 3.7 ppm, the average number of RGD conjugated to each PEG was estimated to be 0.5.

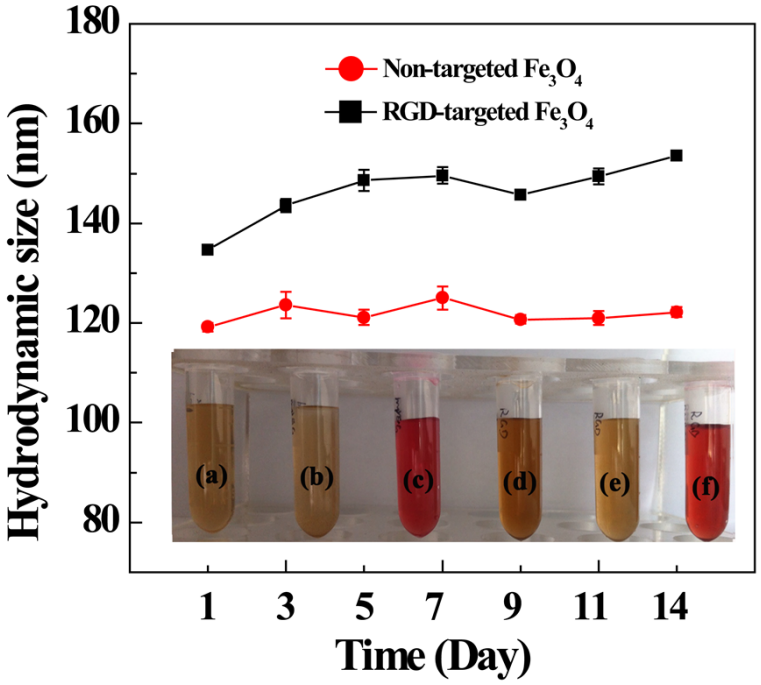

Figure S3. The hydrodynamic size of the non-targeted and RGD-targeted Fe_3O_4 NPs as a function of storage time (inset is the photo of non-targeted Fe_3O_4 NPs dispersed in water (a), PBS (b), cell culture medium (c), and RGD-targeted Fe_3O_4 NPs dispersed in water (d), PBS (e), cell culture medium (f) over a period of one month). The error bar represents variability of the hydrodynamic size estimated *via* comparison of 3 repeated DLS measurements for each sample.

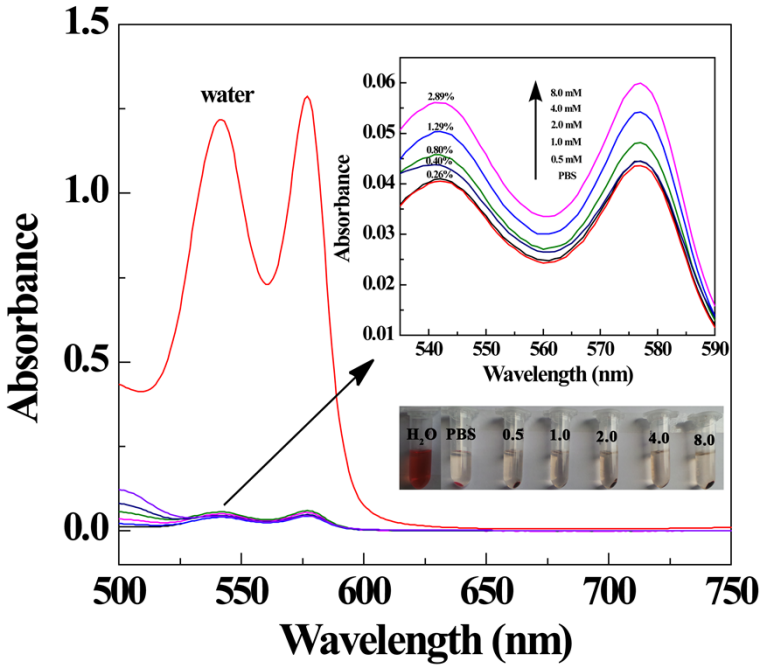

Figure S4. Hemolytical activity of the non-targeted Fe_3O_4 NPs at different Fe concentrations (0.5, 1.0, 2.0, 4.0, and 8.0 mM, respectively). PBS and water were used as negative and positive control, respectively. The bottom-right inset shows the photograph of HRBCs exposed to water, PBS, and PBS containing NPs at different Fe concentrations for 2 h, followed by centrifugation. The upper-right inset shows the enlarged UV-Vis spectra.

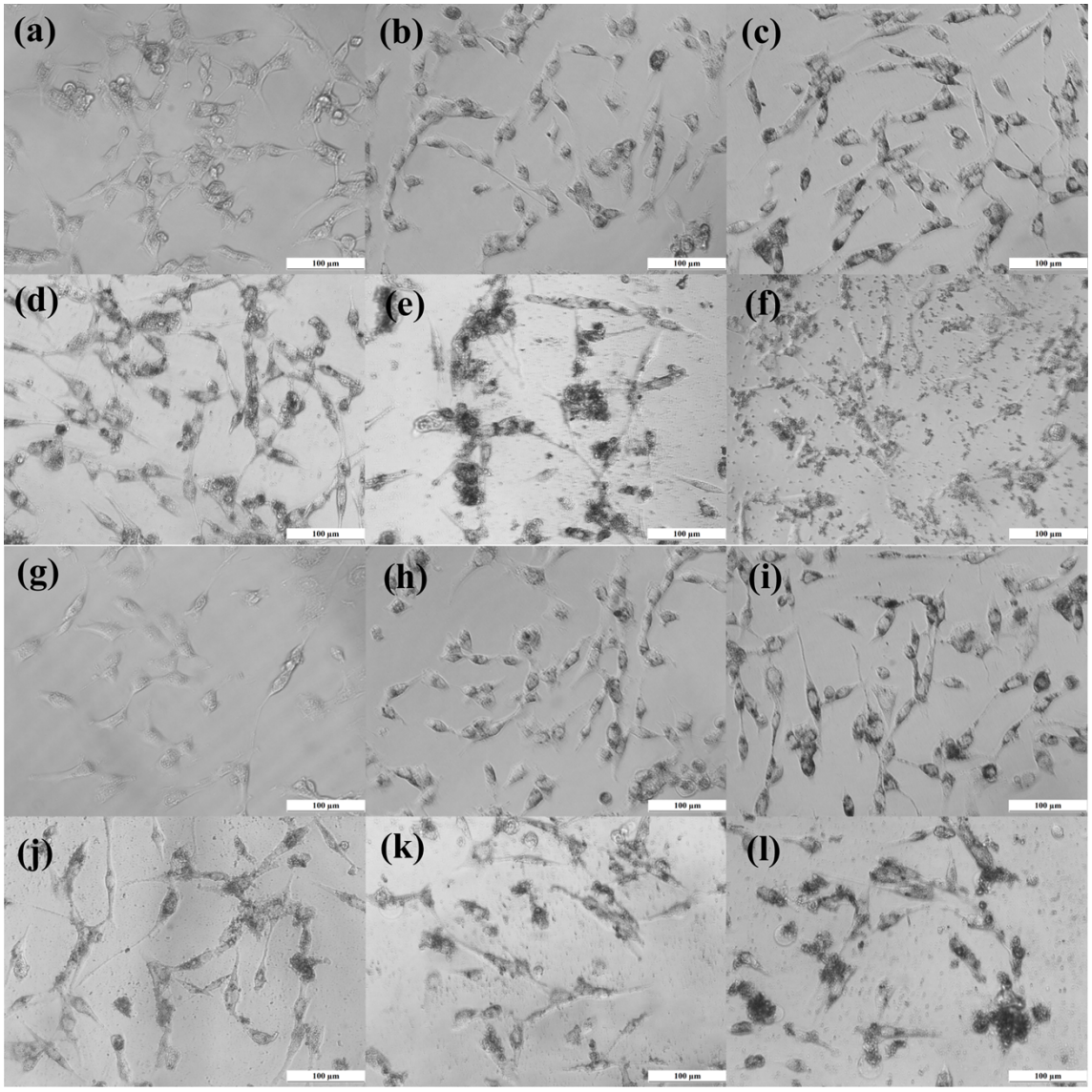

Figure S5. Phase contrast microscopic images of U87MG cells treated with PBS (a, g), non-targeted Fe_3O_4 NPs at the Fe concentrations of 10 μg/mL (b), 25 μg/mL (c), 50 μg/mL (d), 75 μg/mL (e), 100 μg/mL (f), and RGD-targeted Fe_3O_4 NPs at the Fe concentrations of 10 μg/mL (h), 25 μg/mL (i), 50 μg/mL (j), 75 μg/mL (k), and 100 μg/mL (l) for 24 h.

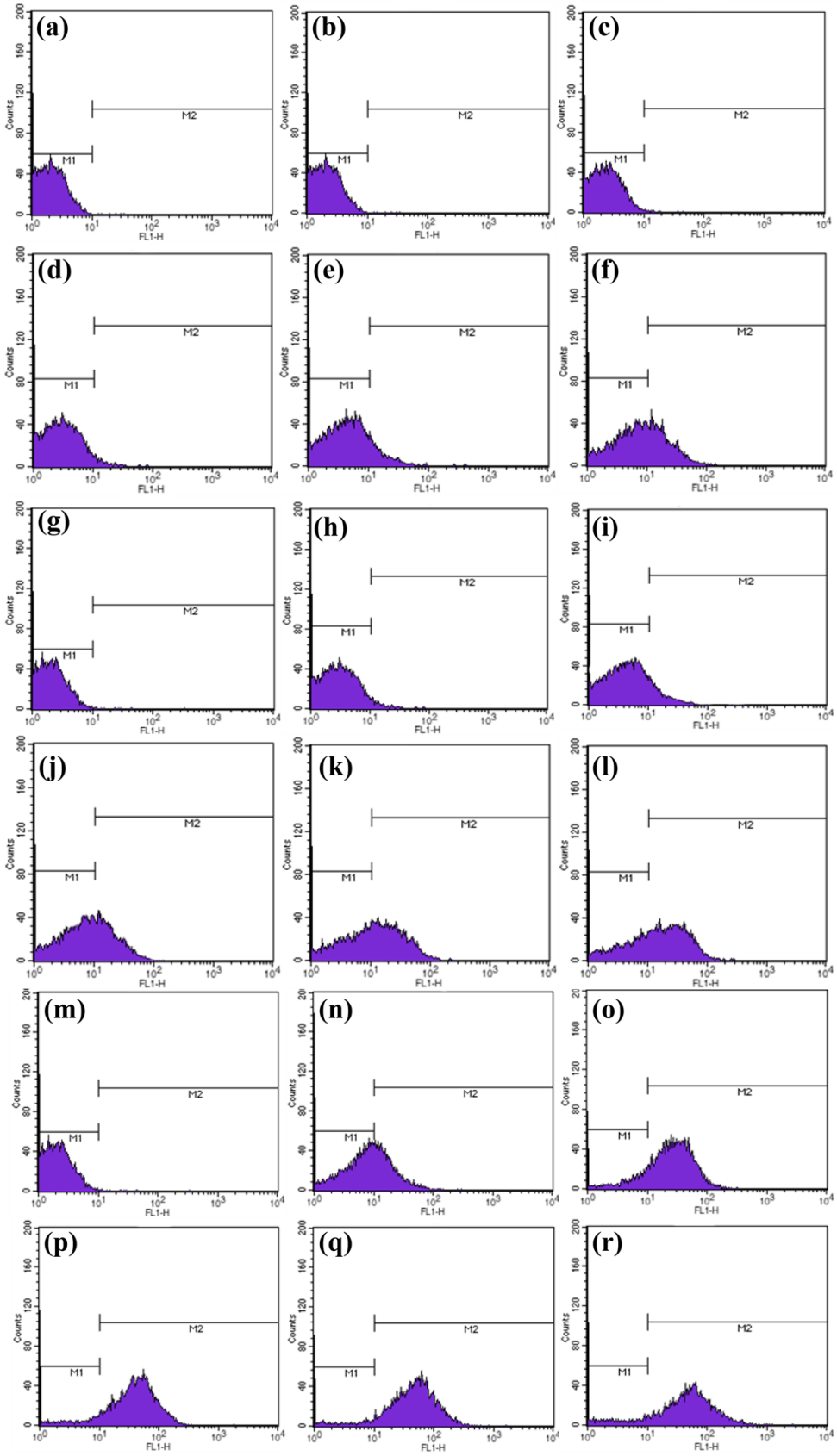

Figure S6. Flow cytometric analysis of the U87MG cells treated with PBS (a, m), non-targeted Fe_3O_4 NPs at the Fe concentrations of 0.125 mM (b), 0.25 mM (c), 0.5 mM (d), 1.0 mM (e), 1.5 mM (f), and RGD-targeted Fe_3O_4 NPs at the Fe concentrations of 0.125 mM (n), 0.25 mM (o), 0.5 mM (p), 1.0 mM (q), 1.5 mM (r) for 4 h. Free RGD-blocked U87MG cells treated with PBS (g) and RGD-targeted Fe_3O_4 NPs at the Fe concentrations of 0.125 mM (h), 0.25 mM (i), 0.5 mM (j), 1.0 mM (k), and 1.5 mM (l) for 4 h were also analyzed for comparison.

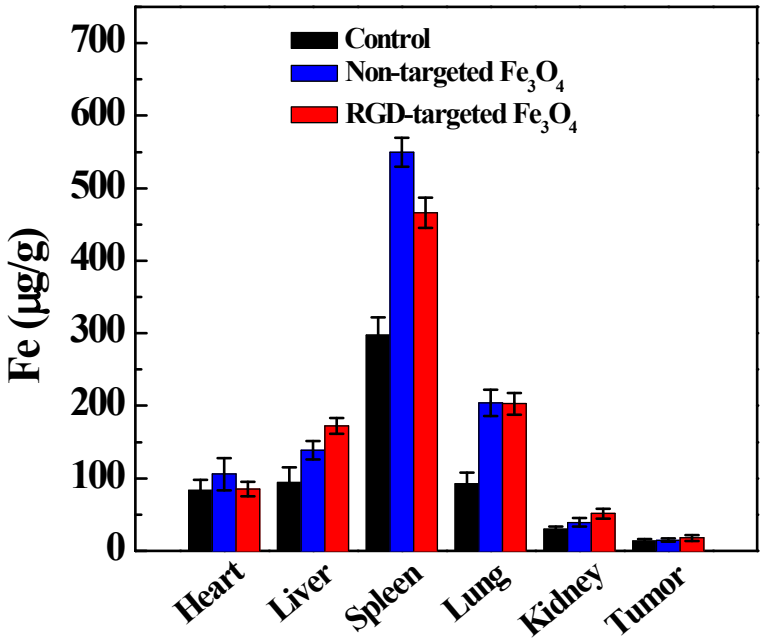

Figure S7. Biodistribution of Fe element in the major organs and tumor of the mice at 24 h post-intravenous injection of the non-targeted or RGD-targeted Fe_3O_4 NPs (600 μg Fe, 0.1 mL PBS, n =3).