Electronic supplementary information (ESI)

Imaging and Targeting of Bioconjugated Fe$_2$O$_3$@Au Nanoparticles with Living Cells

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Fig. S1 TEM images of the Fe$_2$O$_3$ nanoparticles before (a), and after (b) deposition of the gold shell.

The diameter of Fe$_2$O$_3$ nanoparticles is 15.9±5 nm and the diameter of Fe$_2$O$_3$@Au is 56±14 nm.
Fig. S2 Stability of peptide conjugated Fe$_2$O$_3$@Au nanoparticles in different solutions.

UV-visible spectra of (a) R$_8$-Fe$_2$O$_3$@Au nanoparticles, (b) peptide CALNNGGRRRRRRRR modified Fe$_2$O$_3$@Au nanoparticles, and (c) anti-EGFR Fe$_2$O$_3$@Au nanoparticles in H$_2$O, PBS or DMEM with 10% FBS.
Fig. S3 Inhibition of cell proliferation by (1) R₈-Fe₂O₃@Au nanoparticles, (2) CALNNGGRRRRRRRRR capping Fe₂O₃@Au nanoparticles, (3) biotin-R₈, (4) streptavidin-Fe₂O₃@Au nanoparticles and peptide functionalized Fe₂O₃@Au nanoparticles, respectively. The relative cell proliferation rate related to control cells were calculated on the basis of the number of HeLa cells.

For the proliferation assay, HeLa cells at a density of 1×10⁵ cells/cm² were incubated in the medium containing 0.22 nM nanoparticles or 1 µM biotin-R₈ for 24 h, then the proliferation rates related to control sample were calculated on the basis of the number of HeLa cells, respectively. The control samples were HeLa cells which were cultured at same experimental condition without any nanoparticles or peptides. CALNNGGRRRRRRRRR capping Fe₂O₃@Au nanoparticles were prepared by adding an aqueous CALNNGGRRRRRRRR solution to the solution of Fe₂O₃@Au
nanoparticles to give a final concentration of total peptides of 1.38 mM as our previous reports.\textsuperscript{SI}
Fig. S4 ICP-MS analysis of HeLa cells incubated with 0.19 nM R$_8$-Fe$_2$O$_3$@Au, F-R$_8$-Fe$_2$O$_3$@Au, or F-Fe$_2$O$_3$@Au nanoparticles as a function of incubation time. Percentages of cellular uptaken nanoparticles are indicated on the right axis. The initial cell concentration is $1 \times 10^5$ cells/cm$^2$. 
Fig. S5 Bright-field microscopic images of 293 cells (a) and HeLa cells (b) incubated with 0.3 nM anti-EGFR-Fe$_2$O$_3$@Au nanoparticles for 2 h. As control samples, cells (293 (c) and HeLa (d)) were incubated with 0.3 nM streptavidin-Fe$_2$O$_3$@Au nanoparticles for 2 h under the same experimental condition.
Fig. S6 Dark-field and bright-field microscopic images of HeLa cells incubated with 0.3 nM anti-EGFR-Fe$_2$O$_3$@Au nanoparticles for 2 h without (a and d) or with (b and e) 0.3 mg/ml anti-EGFR. As a control sample, HeLa cells were incubated with 0.3 nM streptavidin-Fe$_2$O$_3$@Au nanoparticles for 2 h under same experimental condition (c and f). And relative scatting light intensity of anti-EGFR-Fe$_2$O$_3$@Au nanoparticles on cell membrane (g); the data were obtained by subtracting of the scattering light intensity from anti-EGFR-Fe$_2$O$_3$@Au nanoparticles stained cells with that of control sample.
Additional reference