Click Functionalized Biocompatible Gadolinium Oxide Core-shell Nanocarriers for Imaging of Breast Cancer Cells

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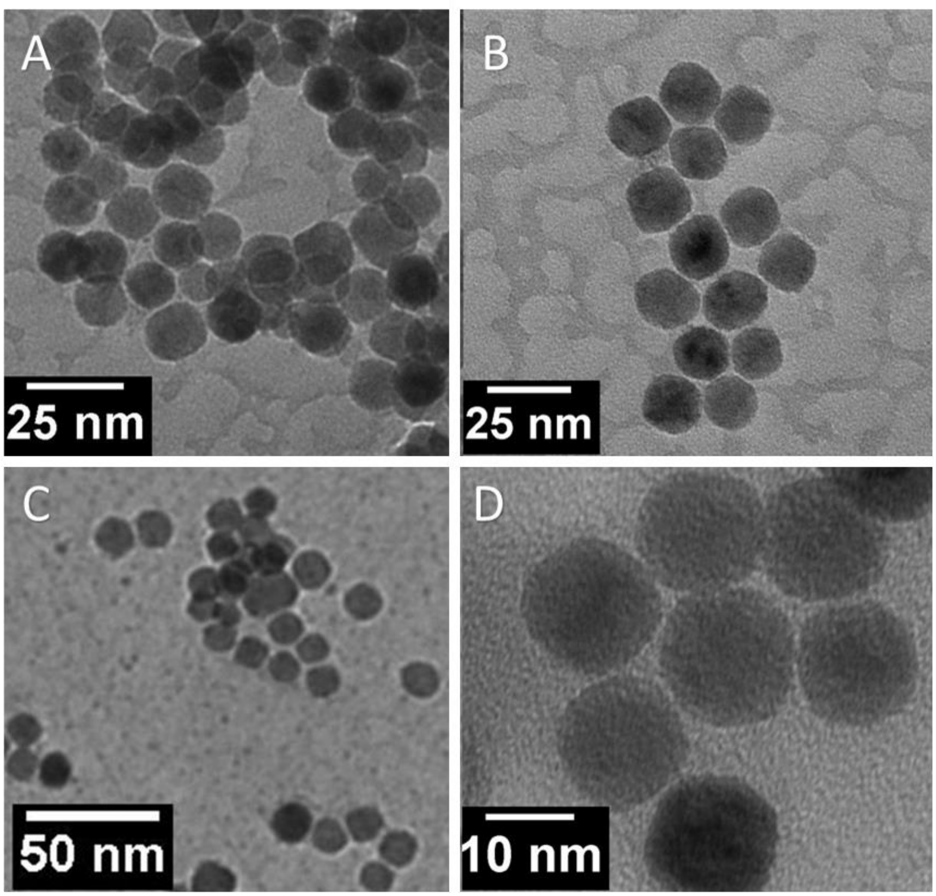

Figure S1: TEM images of iron oxide particles with different magnification **A-B** oleic aicd-capped Fe_3O_4 nanospheres, **C-D** Fe_3O_4 NPs after the removal of oleic acid

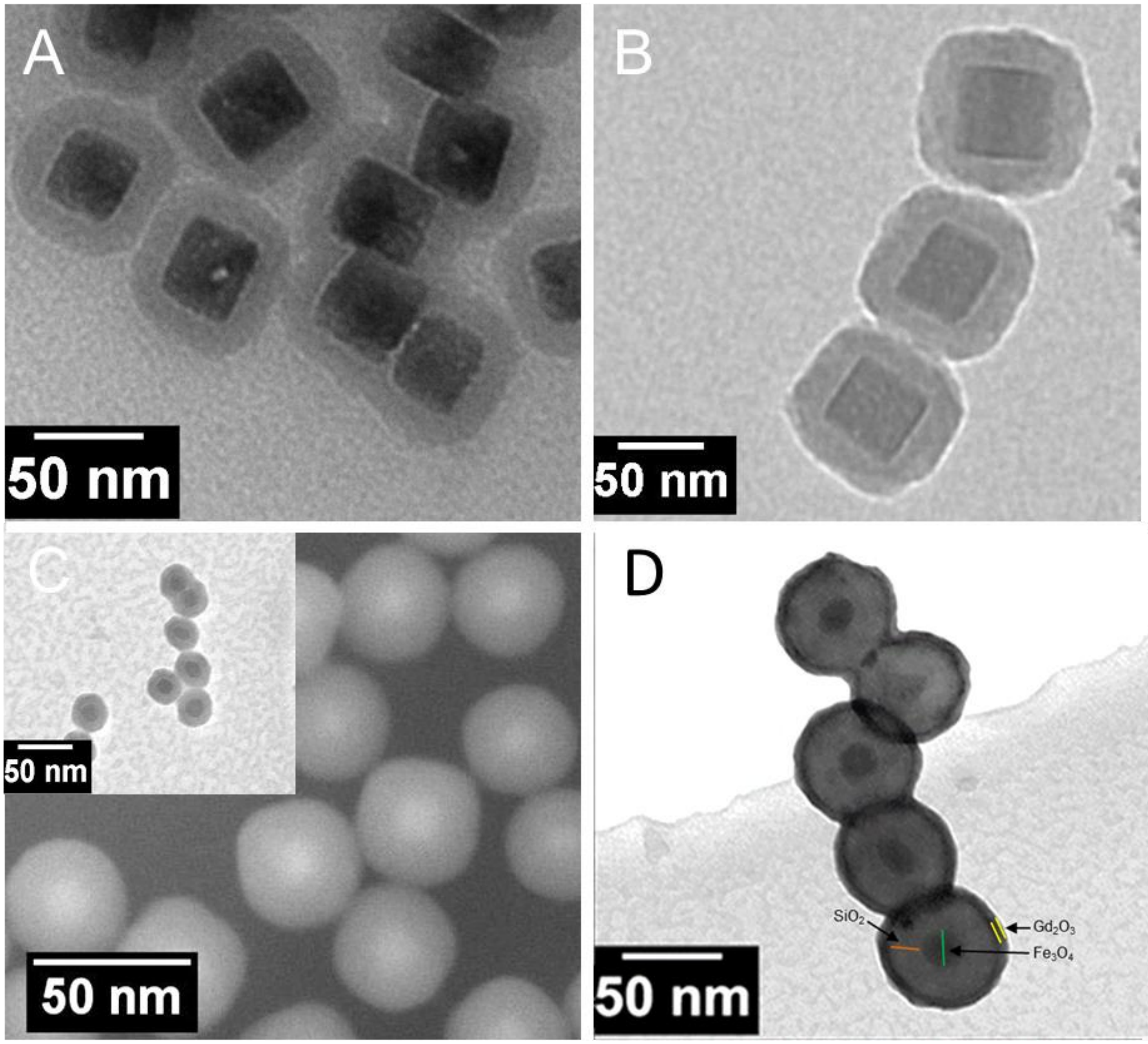

Figure S2: A-B: TEM images with different magnification of $SiO_2@Fe_3O_{4(cubes)}$ NPs, **C-** SEM image of $SiO_2@Fe_3O_{4(spheres)}$ NPs, and **D-** TEM image of $Gd_2O_3@SiO_2@Fe_3O_{4(spheres)}$ showing the clear demarcation of thin layer of gadolinium oxide (**15$\pm$ 5 nm)** on core shell structure.

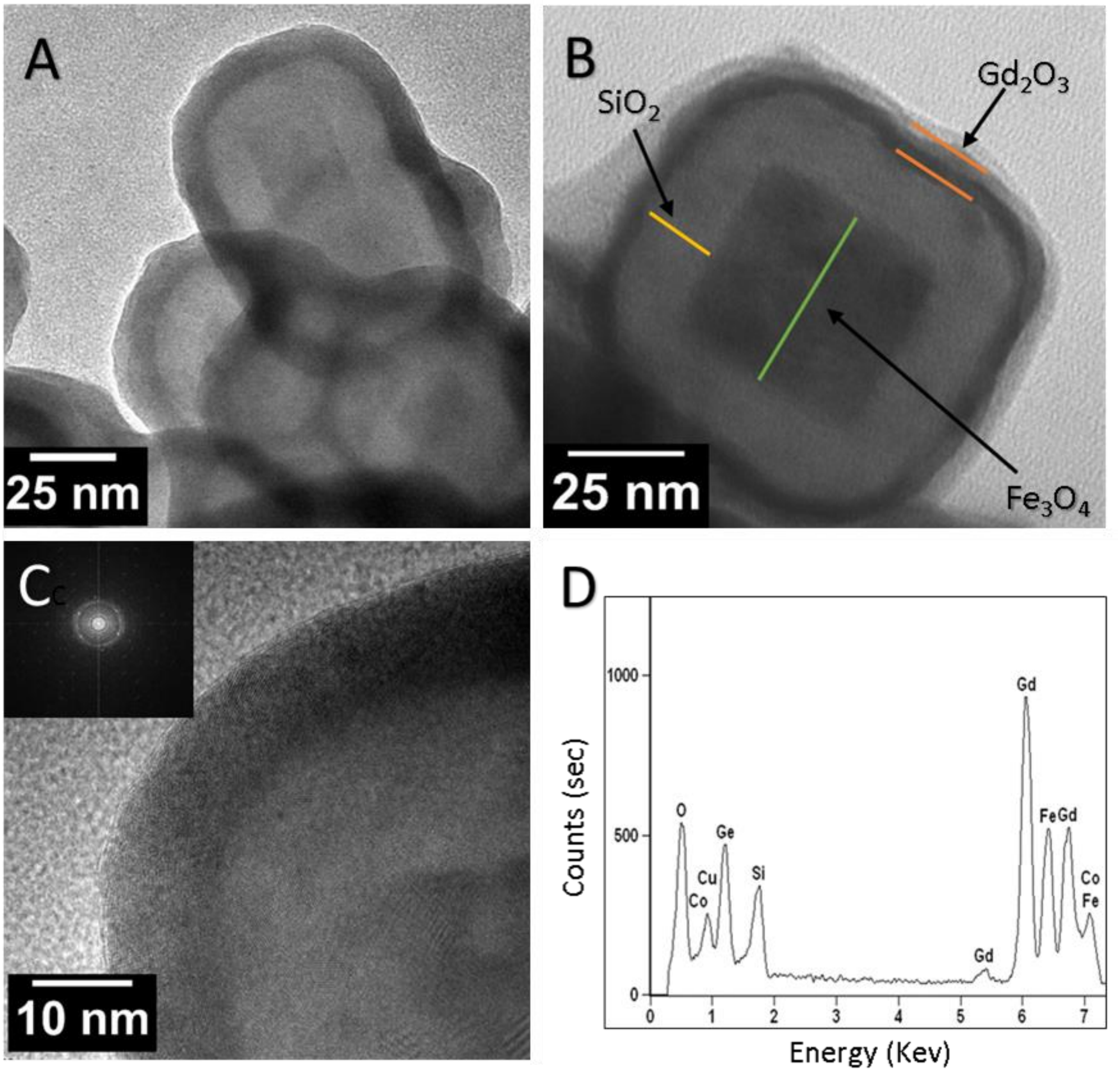

Figure S3: A-B- TEM Images of $Gd_2O_3@SiO_2@Fe_3O_{4(cubes)}$ nanocarriers **C-** High resolution TEM of $Gd_2O_3@SiO_2@Fe_3O_{4(cubes)}$ carriers (the inset for SAED pattern), and **D-** EDX analysis of $Gd_2O_3@SiO_2@Fe_3O_{4(cubes)}$ nanocarriers

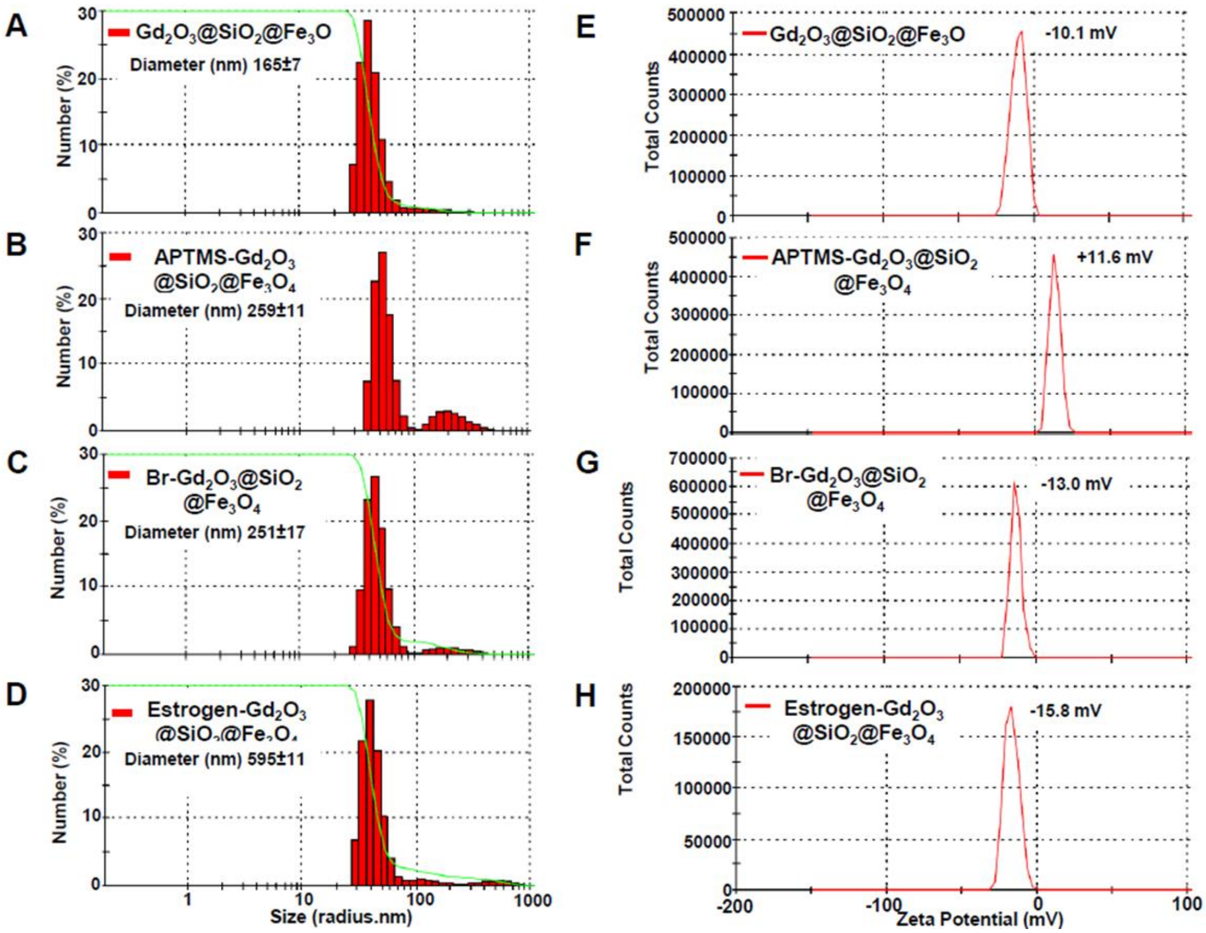

Figure S4: A-D- Dynamic light scattering of the nanocarriers (cube shaped iron oxide as a core) in water showed an increase in average hydrodynamic diameter of nanocarriers after different conjugation steps**. E-H-** Zeta potential measurements displayed a change in surface charge after the attachment of different molecule used for the conjugation of estrogen molecules.

TableS1DLS and Zeta potential

Nanocarriers	DLS (d.nm)	Zeta potential (mV)
$Gd_2O_3@SiO_2@Fe_3O_4$ (cube as a core)	165 ±7	-10.1
APTM-$Gd_2O_3@SiO_2@Fe_3O_4$	259 ±11	+11.6
Br-$Gd_2O_3@SiO_2@Fe_3O_4$	251 ±17	-13.0
estrogen-$Gd_2O_3@SiO_2@Fe_3O_4$	595 ±11	-15.8

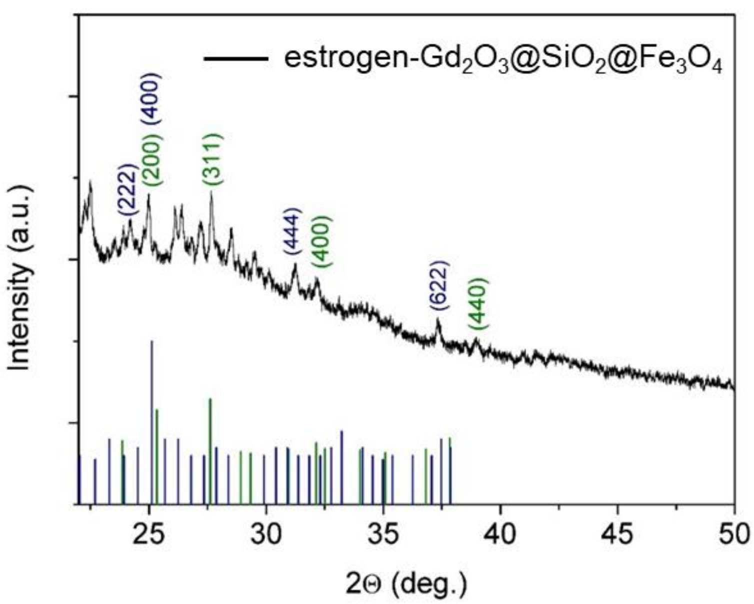

Figure S5: XRD diffraction pattern of $Gd_2O_3@SiO_2@Fe_3O_4$ NPs after conjugation of estrogen via click reaction. The references for magnetite (JCPDS C72-2303) is in green, and for Gd_2O_3 (JCPDS C12-0797) in blue.

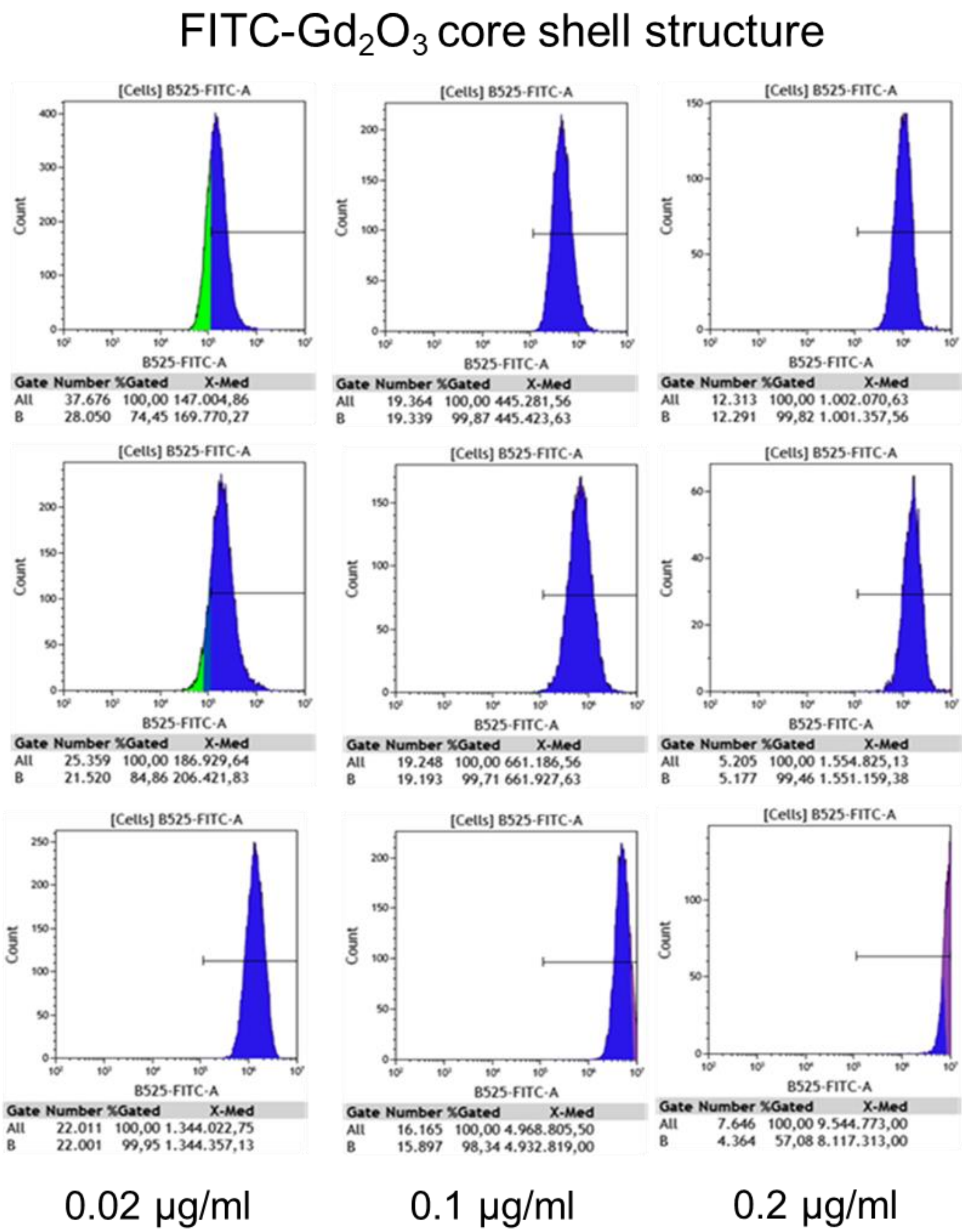

Figure S6: Flow cytometry measurements of FITC conjugated bare-Gd_2O_3@SiO_2@Fe_3O_4 carriers with breast cancer cell line MCF7.

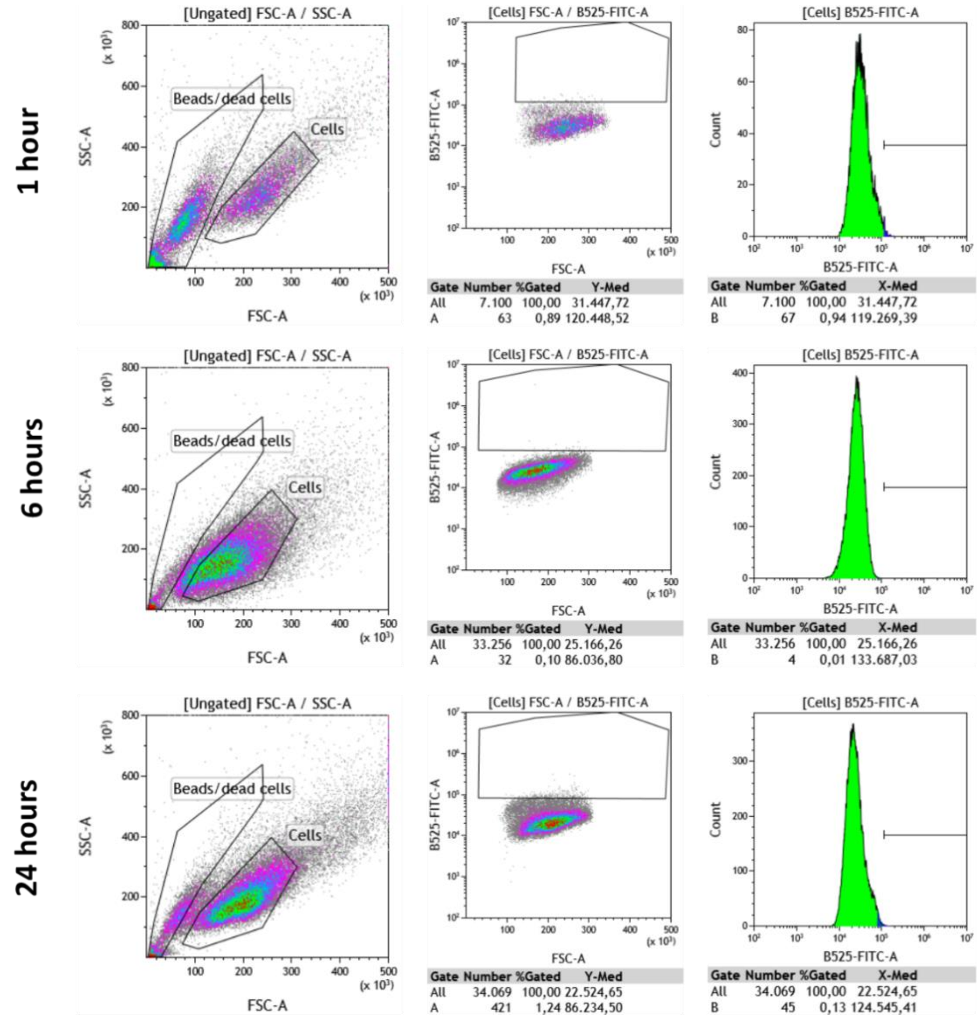

Figure S7: Flow cytometry measurements of pure MCF7 breast cancer cells without the addition of nanocarriers.

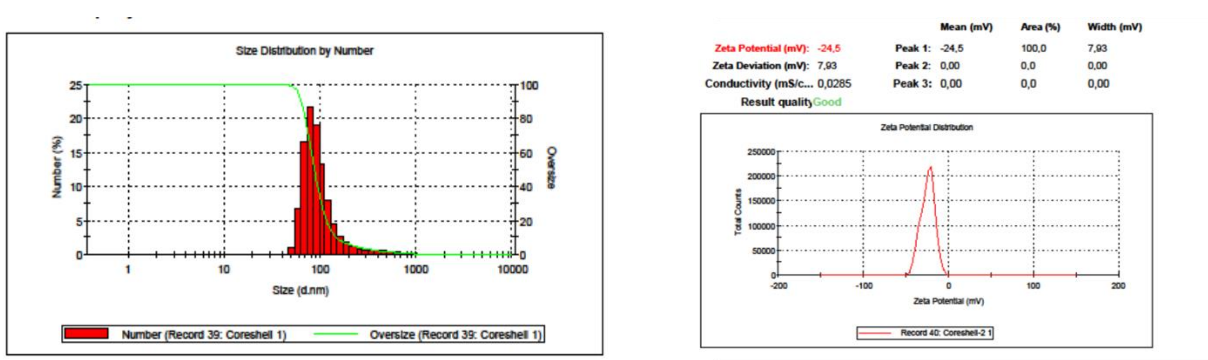

Figure S8: Dynamic light scattering of the nanocarriers (spherical iron oxide as a core) in water showed an increase in average hydrodynamic diameter of nanocarriers as compared to TEM analysis**.** Zeta potential measurements displayed a negative charge when no surface linker or ligand is attached.