In this study, we have developed an efficient cancer-targeted nanoplatform based on Fe₃O₄@ ZnS:Mn nanoparticles, which were functionalized with a redox sensitive cross-linker facilitating a stable activation solely in a reducing intracellular environment upon cellular uptake. To endow this nanoplatform with improved specificity, the composite surface was further modified with human transferrin protein siderophiline, and doxorubicin hydrochloride (DOX) providing a dual-targeted capability to deliver the drug into the cells and stimulate the generation of reactive oxygen species therein. The cell viability was measured via MTS assay and flow cytometry, and the imaging and internalization through confocal microscopy. The quantification of singlet oxygen quantum yield will be also discussed. Our findings indicate that the multifunctional nanocarrier shows an excellent drug loading ability with an enhanced efficiency for photodynamic therapy and improved specificity ascribed to the disulfide bond breakage upon cell entry. This piece of research represents a step forward to designing novel alternatives for treating cancer and describes an innovative protocol for theranostics.

Keywords: theranostics, Fe₃O₄@ ZnS:Mn, nanoparticles

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