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Dual-target recognition sandwich assay based on core-shell magnetic mesoporous silica nanoparticles for sensitive detection of breast cancer cells

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Abstract

A novel dual-target recognition sandwich strategy for selective capture and detection of MCF-7 breast cancer cells based on core-shell magnetic mesoporous silica (Fe_3O_4@nSiO_2@mSiO_2@apt) nanoparticles was developed. Fe_3O_4@nSiO_2@mSiO_2@apt nanoparticles, which were prepared by a layer-by-layer method and were used for the first time to capture cancer cells, have large surface areas, particularly accessible mesochannels, and good biocompatibility, enabling aptamers to be compactly anchored onto the surface of the core-shell magnetic nanoparticles. A mucin 1 protein (MUC1)-targeted Fe_3O_4@nSiO_2@mSiO_2@apt nanoparticle was used as an affinity magnetic isolate material to capture target MCF-7 cells selectively and to reduce interference through affinity interaction between the anti-MUC1 aptamer and the MUC1 protein over-expressed on the surface of the MCF-7 cells. Meanwhile, a folate receptor (FR)-targeted affinity fluorescent probe (FA-BSA-FITC) was developed by coupling folic acid and FITC to the surface of

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