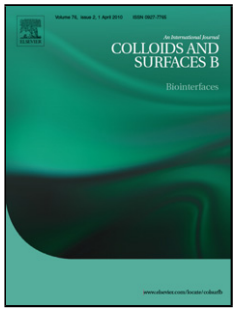


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*Colloids and Surfaces B: Biointerfaces*

# D,L-Lysine functionalized $Fe_3O_4$ nanoparticles for detection of cancer cells

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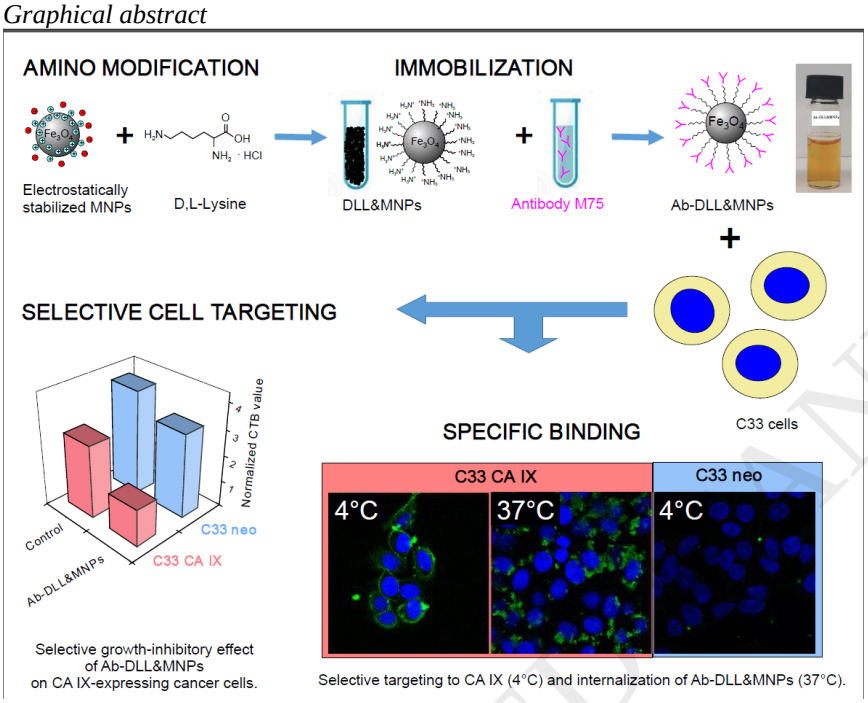
*Graphical abstract*




Highlights (max 85 characters with spaces per bullet)

- Preparation and analysis of lysine-modified magnetic nanoparticles is described.
- Conjugation of antibody against tumor marker CA IX to lysine coating is exhibited.
- Antibody-conjugated nanoparticles bind selectively to CA IX-positive cancer cells.
- Such nanoparticles can internalize, reduce cell growth and perturb tubulin network.
- Antibody-coupled magnetic nanoparticles are promising tools for tumor targeting.

## Abstract

Amino-modified magnetic nanoparticles were prepared by direct chemisorption of biocompatible D,L-lysine (DLL) on electrostatically stabilized magnetic nanoparticles with the aim to bind specific antibodies (Ab) able to detect cancer cells. The magnetic nanoparticles prepared by coprecipitation were stabilized in an acidic medium. A full optimization study of amino modification performed by UV/Vis spectroscopy and Dynamic Light Scattering measurement (DLS) confirmed an optimal DLL/$Fe_3O_4$ weight ratio of 2. The sample was subjected to complex characterizations using different techniques such as UV/Vis, FTIR and X-ray photoelectron spectroscopies (XPS) together with transmission electron microscopy and size/zeta potential measurements. While FTIR spectroscopy, UV/Vis spectroscopy and XPS confirmed the successful amino modification of $Fe_3O_4$ nanoparticles, a characterization using a vibrating sample magnetometer (VSM) indicated superparamagnetic behavior in all the prepared samples, suggesting that the coating process did not significantly affect the size and structure of the $Fe_3O_4$ nanoparticles. Magnetic nanoparticles with the optimal DLL content were conjugated with the M75 monoclonal antibody specific to carbonic