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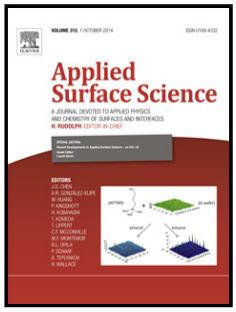

Title: Synthesis and characterization of recyclable clusters of magnetic nanoparticles as doxorubicin carriers for cancer therapy

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Synthesis and characterization of recyclable clusters of magnetic nanoparticles as doxorubicin carriers for cancer therapy

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Abstract

This study focuses on the synthesis and characterization of recyclable clusters of magnetic nanoparticles (CMNPs) as doxorubicin carriers for cancer therapy. Fe_3O_4 nanoparticles were used as magnetically responsive carriers, the modified polyethylene glycol dicarboxylic acid (APS-PEG-TFEE) acted as a steady bridge between Fe_3O_4 and drug. The prepared CMNPs exhibited a size within 20 nm, good stability and super-paramagnetic responsibility (M_s 62.02 emu/g); doxorubicin (DOX) can be successfully loaded to CMNPs at a loading rate of 76.19% by electrostatic interaction. Moreover, the release studies in vitro showed that the drug-loaded carriers (CMNPs-DOX) had excellent pH-sensitivity, 76.16% of DOX was released within 72 h at pH 4.0, and the secondary drug loading rate was nearly 52%. WST-1 assays in model breast cancer cells (MCF-7) demonstrated that CMNPs-DOX exhibited high anti-tumor activity, while the CMNPs were practically non-toxic. Thus, our results revealed that CMNPs would be a competitive candidate for drug delivery carriers and CMNPs-DOX could be used in targeted cancer therapy in the near future.

Keywords: Fe_3O_4; magnetic targeted; pH-sensitive; doxorubicin; cancer therapy

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