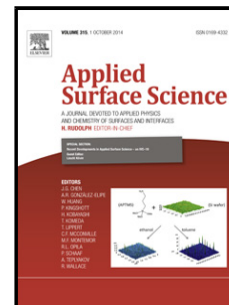


Accepted Manuscript

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

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PII: S0169-4332(14)02184-9
DOI: <http://dx.doi.org/doi:10.1016/j.apsusc.2014.09.184>
Reference: APSUSC 28840

To appear in: *APSUSC*

Received date: 8-7-2014
Revised date: 27-9-2014
Accepted date: 28-9-2014

Please cite this article as: J. Wu, Y. Wang, W. Jiang, S. Xu, R. Tian, Synthesis and characterization of recyclable clusters of magnetic nanoparticles as doxorubicin carriers for cancer therapy, *Applied Surface Science* (2014), <http://dx.doi.org/10.1016/j.apsusc.2014.09.184>

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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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