

Accepted Manuscript

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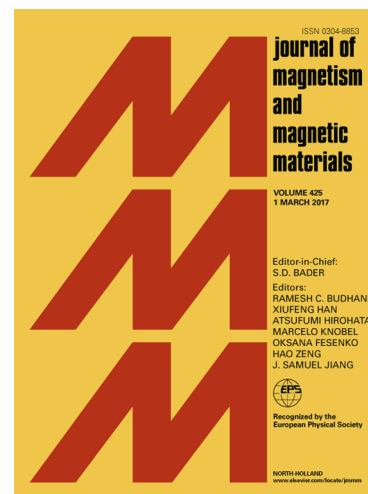
PII: S0304-8853(18)31221-6
DOI: <https://doi.org/10.1016/j.jmmm.2018.10.006>
Reference: MAGMA 64417

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 23 April 2018
Revised Date: 5 September 2018
Accepted Date: 1 October 2018

Please cite this article as: B.A. Zasońska, V.I. Pustovyy, A.V. Babinskiy, O.M. Palyvoda, V.F. Chekhun, I. Todor, E. Petrovský, O.I. Kuzmenko, D. Horák, Combined antitumor effect of surface-modified superparamagnetic maghemite nanoparticles and a vitamin E derivative on experimental Walker-256 mammary gland carcinosarcoma, *Journal of Magnetism and Magnetic Materials* (2018), doi: <https://doi.org/10.1016/j.jmmm.2018.10.006>

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Combined antitumor effect of surface-modified superparamagnetic maghemite nanoparticles and a vitamin E derivative on experimental Walker-256 mammary gland carcinosarcoma

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ABSTRACT

In a search for efficient anti-tumor agent, silica-coated superparamagnetic nanoparticles were designed and used in combination with vitamin E derivative as a potential new tool for anticancer treatment. The particles were characterized by numerous techniques, such as transmission electron microscopy and dynamic light scattering to determine the particle morphology and size both in dry state and water, atomic absorption spectroscopy to analyze the iron content, Fourier-transform infrared spectroscopy to confirm the presence of the functional groups, and vibrating sample magnetometry to determine the magnetic properties and content of maghemite. The next aim was to assess effect of the nanoparticles on suppression of experimental mammary gland carcinosarcoma W-256. Strong antitumor effect was achieved only with combined application of $\gamma\text{-Fe}_2\text{O}_3\text{@SiO}_2$ and acetate derivative of α -tocopherol (Toc-6-Ac) resulting in 58 % of tumor volume reduction. The results were compared with those obtained with poly(*N,N*-dimethylacrylamide)-coated iron oxide particles described earlier.

Keywords: superparamagnetic, nanoparticles, α -tocopherol, mammary gland carcinosarcoma

1. INTRODUCTION

Magnetic iron oxide nanoparticles have recently received a great deal of attention due to their potential biomedical applications [1-4] as contrast agents in magnetic resonance imaging (MRI) [5], magnetic separation of cells and proteins [1], drug delivery [6,7], hyperthermia [8,9], etc. Iron oxide nanoparticles carrying anticancer drugs, such as flutamide [10] or doxorubicin, demonstrated

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