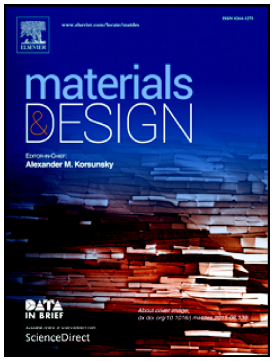
Accepted Manuscript



Synthesis and characterization of multilayered nanobiohybrid magnetic particles for biomedical applications

S.A. Maboudi, S.A. Shojaosadati, A. Arpanaei

PII: S0264-1275(16)31458-7
DOI: doi: 10.1016/j.matdes.2016.11.064
Reference: JMADE 2500

To appear in: *Materials & Design*

Received date: 21 August 2016
Revised date: 15 November 2016
Accepted date: 16 November 2016

Please cite this article as: S.A. Maboudi, S.A. Shojaosadati, A. Arpanaei , Synthesis and characterization of multilayered nanobiohybrid magnetic particles for biomedical applications. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jmade(2016), doi: 10.1016/j.matdes.2016.11.064

Synthesis and characterization of multilayered nanobiohybrid magnetic particles for biomedical applications

Maboudi S.A[a], Shojaosadati S.A[b,*], and Arpanaei A.[c,*]
[a] Nanomaterials Group, Faculty of Engineering, Tarbiat Modares University, Tehran, PO Box: 14155-114, Tehran, Iran.
[b] Biotechnology Group, Faculty of Chemical Engineering, Tarbiat Modares University, Tehran, PO Box: 14155-114, Tehran, Iran.
[c] Department of Industrial and Environmental Biotechnology, National Institute of Genetic Engineering and Biotechnology, PO Box: 14965-161, Tehran, Iran.

shoja_sa@modares.ac.ir

arpanaei@yahoo.com

Abstract

In this study, new magnetic nanobiohybrid particles with a multilayered structure were prepared. 7±1 nm oleic acid modified magnetite nanoparticles (MNP) were synthesized via the chemical coprecipitation method. Then, magnetite nanoparticles clusters were coated with a thin silica shell (MS) by the sol-gel approach. The as-synthesized MS particles have a spherical shape and an average size of 147±20 nm according to SEM images. Then, bovine serum albumin was conjugated 9-10 wt% to aminated particles through glutaraldehyde activation (BSA-MS). BSA-MS particles were then compared with MS particles as a platform for precipitation of subsequent protein shell which was imprinted by desolvation method (BSA shell-BSA-MS & BSA shell-MS particles, respectively). TGA data revealed that an albumin shell of about 17 and 31 wt% has been formed on MS and BSA-MS particles, respectively. VSM analysis results indicated the