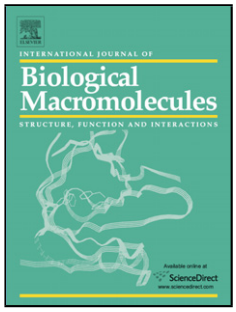

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PII: S0141-8130(17)31581-7
DOI: http://dx.doi.org/doi:10.1016/j.ijbiomac.2017.07.047
Reference: BIOMAC 7855

To appear in: *International Journal of Biological Macromolecules*

Received date: 2-5-2017
Revised date: 21-6-2017
Accepted date: 9-7-2017

Please cite this article as: Muhammad Bilal, Tahir Rasheed, Hafiz M.N.Iqbal, Chuanlong Li, Hongbo Hu, Xuehong Zhang, Development of silver nanoparticles loaded chitosan-alginate constructs with biomedical potentialities, International Journal of Biological Macromoleculeshttp://dx.doi.org/10.1016/j.ijbiomac.2017.07.047

Development of silver nanoparticles loaded chitosan-alginate constructs with biomedical potentialities

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Abstract

Herein, a facile biosynthesis of silver nanoparticles (AgNPs) and AgNPs-loaded chitosan-alginate constructs with biomedical potentialities is reported. The UV-Vis spectroscopic profile confirmed the synthesis of AgNPs using methanolic leaves extract of *Euphorbia helioscopia.* The newly developed AgNPs were characterized using various analytical and imaging techniques including UV-Vis and FT-IR spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), atomic force microscopy (AFM), and transmission electron microscopy (TEM). The optimally yielded AgNPs at 24 h reaction period were loaded onto various chitosan-alginate constructs. A maximum of 95% loading efficiency (LE) was recorded with a chitosan: alginate ratio at 2:1, followed by 81% at 2:2 ratios. The anti-bacterial activities of AgNPs and AgNPs loaded chitosan-alginate constructs were tested against six bacterial strains i.e. *Staphylococcus aureus*, *Pseudomonas aeruginosa, Klebsiella pneumoniae, Acinetobacter baumannii, Morganella morganii* and *Haemophilus influenza*. A significant reduction in the log values was recorded for all test constructs, in comparison to the initial bacterial count (control value, *i.e.,* 1.5×10^8 CFU/mL). The cytotoxicity profile revealed complete biocompatibility against normal cell line i.e. L929. Almost all constructs showed considerable cytotoxicity up to certain extant against human epithelial cells (HeLa) cancer cells. In summary, the highest antibacterial activities along with anti-cancer behavior both suggest the biomedical potentialities of newly engineered AgNPs and AgNPs-loaded chitosan-alginate constructs.