

Accepted Manuscript

Optimization of silver-containing bioglass nanoparticles envisaging biomedical applications

A.C. Vale, P.R. Pereira, A.M. Barbosa, E. Torrado, N.M. Alves



PII: S0928-4931(17)34977-9
DOI: doi:[10.1016/j.msec.2018.09.027](https://doi.org/10.1016/j.msec.2018.09.027)
Reference: MSC 8890
To appear in: *Materials Science & Engineering C*
Received date: 27 December 2017
Revised date: 28 July 2018
Accepted date: 7 September 2018

Please cite this article as: A.C. Vale, P.R. Pereira, A.M. Barbosa, E. Torrado, N.M. Alves, Optimization of silver-containing bioglass nanoparticles envisaging biomedical applications. *Msc* (2018), doi:[10.1016/j.msec.2018.09.027](https://doi.org/10.1016/j.msec.2018.09.027)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Optimization of Silver-containing Bioglass Nanoparticles Envisaging Biomedical Applications

A. C. Vale,^{a,b} P. R. Pereira,^{a,b} A. M. Barbosa,^{b,c} E. Torrado,^{b,c} and N. M. Alves^{a,b,*}

^a3B's Research Group, I3Bs – Research Institute on Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, AvePark, 4805-017 Barco, Guimarães, Portugal.

^bICVS/3B's PT Associate Laboratory, Guimarães, Portugal.

^cLife and Health Sciences Research Institute (ICVS), School of Health Sciences, University of Minho, Braga, Portugal.

*Corresponding author.

E-mail address: naves@dep.uminho.pt (N. M. Alves).

Abstract.

Bioglass nanoparticles (BGs) are of outmost importance in the biomedical field, because their unique characteristics, namely osteoconductivity and osteoinductivity, and also in certain conditions, angiogenic and bactericidal properties. In this work, novel bioglass nanoparticles containing silver (AgBGs) were synthesized by a sol-gel method, adopting different thermal treatments to obtain new nanoparticles with bioactive and antibacterial features. This is the first systematic study of the effect of the thermal treatment on the properties of AgBGs. The effect of the studied thermal treatments on the properties of synthesized nanoparticles was analysed by several characterization techniques: FT-IR, XRD, S-TEM, SEM-EDS and Zeta potential. FT-IR allowed the identification of the characteristic peaks of the nanoparticles and XRD revealed the presence of the characteristic peaks of an apatite-like phase. By S-TEM analysis it was found that the produced nanoparticles are dense and have a diameter less than 200 nm. The SEM micrographs showed their surface morphology and Zeta potential measurements were performed to study their suspension stability. Additionally, *in vitro* bioactivity tests confirmed their bioactive potential and the microbiological tests evidenced their bactericidal effect. These promising AgBGs could be incorporated either in 2D or 3D structures for several biomedical applications, namely in the orthopedic and dental fields.

Keywords: Nanoparticles, bioglass® (BG), silver (Ag), antibacterial activity.

Download English Version:

<https://daneshyari.com/en/article/10155307>

Download Persian Version:

<https://daneshyari.com/article/10155307>

[Daneshyari.com](https://daneshyari.com)