

## Accepted Manuscript

Interaction between bovine serum albumin and mesoporous silica nanoparticles functionalized with biopolymers

Valentina Nairi, Sara Medda, Marco Piludu, Maria Francesca Casula, Maria Vallet-Regi, Maura Monduzzi, Andrea Salis

PII: S1385-8947(18)30011-1  
DOI: <https://doi.org/10.1016/j.cej.2018.01.011>  
Reference: CEJ 18331

To appear in: *Chemical Engineering Journal*



Please cite this article as: V. Nairi, S. Medda, M. Piludu, M.F. Casula, M. Vallet-Regi, M. Monduzzi, A. Salis, Interaction between bovine serum albumin and mesoporous silica nanoparticles functionalized with biopolymers, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.01.011>

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.

# Interaction between bovine serum albumin and mesoporous silica nanoparticles functionalized with biopolymers

*Valentina Nairi<sup>1</sup>, Sara Medda<sup>1</sup>, Marco Piludu<sup>2</sup>, Maria Francesca Casula<sup>1</sup>, Maria Vallet-Regí<sup>3,\*</sup>,  
Maura Monduzzi<sup>1,\*</sup>, and Andrea Salis<sup>1,\*</sup>*

<sup>1</sup>Dipartimento di Scienze Chimiche e Geologiche, Università di Cagliari-CSGI and CNBS, Cittadella Universitaria, S.S. 554 bivio Sestu, 09042 Monserrato, Cagliari, Italy

<sup>2</sup>Dipartimento di Scienze Biomediche, Università di Cagliari, Cittadella Universitaria, S.S. 554 bivio Sestu, 09042 Monserrato, Cagliari, Italy

<sup>3</sup>Departamento de Química Inorgánica y Bioinorgánica, Facultad de Farmacia, Universidad Complutense de Madrid, Plaza Ramon y Cajal s/n, Instituto de Investigación Sanitaria Hospital 12 de Octubre i+12 ; Centro de Investigación Biomedica en Red de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Madrid, Spain

## ABSTRACT

Biomedical application of nanoparticles is largely associated to their fate in biological media which, in turn, is related to their surface properties. Surface functionalization plays a key role in determining biodegradation, cytotoxicity and biodistribution through interactions which may be mediated by the macromolecules occurring in biological media. A typical example is given by several proteins which lead to the formation of coated nanoparticles referred as protein corona. In this work we focus on mesoporous silica nanoparticles which, due to their intrinsic textural features, show potential as carriers for sustained drug release. Mesoporous silica nanoparticles functionalized by different biopolymers such as hyaluronic acid and chitosan were synthesized and characterized through small angle x-rays scattering, thermal analysis, and infrared spectroscopy. Biopolymer-coated mesoporous silica nanoparticles were used to investigate the interaction with bovine serum albumin, and to point out the role of different biopolymer coating. Gold-conjugated-bovine serum albumin was used to gain evidence on the occurrence of surface bound proteins enabling direct observation by transmission electron microscopy. Our findings provide insights on how different biopolymers affect the formation of a protein corona around functionalized mesoporous silica nanoparticles.

**Keywords:** Mesoporous silica nanoparticles, hyaluronic acid, chitosan, bovine serum albumin, protein corona, gold nano particles.

Download English Version:

<https://daneshyari.com/en/article/6579945>

Download Persian Version:

<https://daneshyari.com/article/6579945>

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