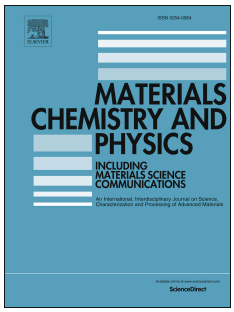
Accepted Manuscript



Formation of complexes between functionalized chitosan membranes and copper: A study by angle resolved XPS

Belén Jurado-López, Rodrigo Silveira Vieira, Rodrigo Balloni Rabelo, Marisa Masumi Beppu, Juan Casado, Enrique Rodríguez-Castellón

PII: S0254-0584(16)30752-0

DOI: 10.1016/j.matchemphys.2016.10.018

Reference: MAC 19226

To appear in: *Materials Chemistry and Physics*

Received Date: 8 August 2015

Revised Date: 4 October 2016

Accepted Date: 15 October 2016

Please cite this article as: B. Jurado-López, R.S. Vieira, R.B. Rabelo, M.M. Beppu, J. Casado, E. Rodríguez-Castellón, Formation of complexes between functionalized chitosan membranes and copper: A study by angle resolved XPS, *Materials Chemistry and Physics* (2016), doi: 10.1016/j.matchemphys.2016.10.018.

Formation of complexes between functionalized chitosan membranes and copper: a study by angle resolved XPS

Belén Jurado-López[a], Rodrigo Silveira Vieira[b], Rodrigo Balloni Rabelo[c], Marisa Masumi Beppu[c], Juan Casado[d], Enrique Rodríguez-Castellón[a]*

[a] *Departamento de Química Inorgánica, Facultad de Ciencias, Universidad de Málaga, 29071 Málaga, Spain*
[b] *Chemical Engineering Department, Universidade Federal do Ceará, UFC, 60455-760 Fortaleza, CE, Brazil*
[c] *School of Chemical Engineering, University of Campinas, UNICAMP, P.O. Box 6066, 13081-970 Campinas, SP, Brazil*
[d] *Departamento de Química-Física, Facultad de Ciencias, Universidad de Málaga, 29071 Málaga, Spain*

Abstract

Chitosan is a biopolymer with potential applications in various fields. Recently, it has been used for heavy metals removal like copper, due to the presence of amino and hydroxyl groups in its structure. Chitosan membranes were crosslinked with epichlorohydrin and bisoxirano and functionalized with chelating agents, such as, iminodiacetic acid, aspartic acid and tris-(2-amino-ethyl) polyamine. These membranes were used for copper adsorption and the formed complexes were characterized. Thermal and crystalline properties of chitosan membranes were studied by TG-DCS and X-ray diffraction. Raman, XPS and FT-IR data confirmed that copper is linked to the modified chitosan membranes by the amino groups. The oxidation state of copper-chitosan membranes were also studied by angle resolved XPS, and by UV-Vis diffuse reflectance spectroscopy.

Keywords: Biomaterials; polymers; X-ray photo-emission spectroscopy (XPS); Raman spectroscopy and scattering; thermogravimetric analysis (TGA); chemisorption

Corresponding author: Enrique Rodríguez Castellón, *Departamento de Química Inorgánica, Facultad de Ciencias, Universidad de Málaga, 29071 Málaga, Spain.*
E-mail address: castellon@uma.es