

Accepted Manuscript

Preparation and characterization of cross-linked chitosan/
palladium nanocomposites for catalytic and antibacterial activity

S. Dhanavel, N. Manivannan, N. Mathivanan, Vinod Kumar
Gupta, V. Narayanan, A. Stephen



PII: S0167-7322(18)30092-8
DOI: doi:[10.1016/j.molliq.2018.02.076](https://doi.org/10.1016/j.molliq.2018.02.076)
Reference: MOLLIQ 8718
To appear in: *Journal of Molecular Liquids*
Received date: 6 January 2018
Revised date: 12 February 2018
Accepted date: 17 February 2018

Please cite this article as: S. Dhanavel, N. Manivannan, N. Mathivanan, Vinod Kumar Gupta, V. Narayanan, A. Stephen , Preparation and characterization of cross-linked chitosan/palladium nanocomposites for catalytic and antibacterial activity. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.02.076](https://doi.org/10.1016/j.molliq.2018.02.076)

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.

Preparation and characterization of cross-linked chitosan/palladium nanocomposites for catalytic and antibacterial activity

S Dhanavel^a, N Manivannan^b, N Mathivanan^b, Vinod Kumar Gupta^{c,d}, V Narayanan^e, A Stephen^{a,*}

^aMaterial Science Centre, Department of Nuclear Physics, University of Madras, Guindy Campus, Chennai-25, India.

^bBiocontrol and Microbial Metabolites Lab, Centre for Advanced Studies in Botany, University of Madras, Guindy Campus, Chennai, Chennai – 600 025

^cDepartment of Biological Sciences, King Abdulaziz University, Jeddah 21589, Saudi Arabia.

^dDepartment of Applied Chemistry, University of Johannesburg, Johannesburg, South Africa.

^eDepartment of Inorganic Chemistry, University of Madras, Guindy Campus, Chennai 600 025, India.

*E-mail: stephen_arum@hotmail.com

Phone: 044-22202802, Fax. 044-22351269

Abstract

Simple chemical reduction method has been used to synthesize the chitosan supported palladium nanoparticles. The prepared samples were analyzed using various characterizations. 4 - nitrophenol (4-NP) is a toxic water pollutant. The catalytic hydrogenation of recalcitrant pollutant by sodium borohydride is the prime model reaction that can be easily analyzed using the spectroscopic techniques. The catalytic performance of the synthesized chitosan/Pd nanocomposites with different weight percentages of palladium, for 4-nitrophenol reduction was also investigated. On increasing the palladium concentration, the catalytic activity towards conversion of highly toxic 4-nitrophenol to eco-friendly 4-aminophenol and antibacterial activity against human pathogens is increased due to non-agglomerative nature of mono-dispersed palladium nanoparticles. The kinetic rate constant during the catalytic performance was found to be 1.95×10^{-3} , 2.41×10^{-3} and $4.01 \times 10^{-3} \text{ s}^{-1}$ for CS/Pd-5%, CS/Pd-10% and CS/Pd-15% respectively. The nanocomposites exhibited superior antibacterial efficacy against both Gram negative and Gram positive bacteria. The *in vitro* minimum inhibitory concentration of the compound against human pathogens was determined. Further, the nanocomposite is screened for hemolytic activity and it proved that the chitosan stabilized Pd NPs are non-toxic on RBCs cells up to the concentration of 25 $\mu\text{g/ml}$ among tested concentration.

Keywords: Chitosan/Pd composites; reduction of nitrophenol; anti-bacterial activity

Download English Version:

<https://daneshyari.com/en/article/7842670>

Download Persian Version:

<https://daneshyari.com/article/7842670>

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