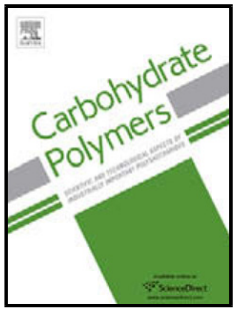


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# Biocompatible chitosan based hydrogels for potential application in local tumour therapy

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Highlights

- Hydrogels based on chitosan and nitrosalicyladehyde were synthesized *via* DCC chemistry
- The hydrogels have superporous morphology, elastic properties and good recovery capacity
- They swell very fast in different pH media and preserved their dimensions in basic medium
- They present *in vitro* citotoxicity on HeLa cells and *in vivo* biocompatibility in laboratory rats

## Abstract

A series of hydrogels based on chitosan polyamine and nitrosalicylaldehyde were prepared *via* dynamic covalent chemistry (DCC), by imination and transimination reactions towards ordered clusters which play the role of crosslinking nodes of the chitosan network. The hydrogelation mechanism has been proved through NMR and FTIR spectroscopy, X-ray diffraction and polarized light microscopy. The successful preparation of the hydrogels and their mechanical properties were further investigated using rheological measurements. By electron scanning microscopy, the hydrogels exhibited a channels microstructure morphology which critically influenced their fast swelling by capillarity. The hydrogels cytotoxicity was explored *in vitro* on HeLa cancer cells and their biocompatibility was monitored *in vivo* by subcutaneous implantation on rats. The novel hydrogels proved good *in vitro* cytotoxicity on the HeLa cells and also *in vivo* biocompatibility in rats. Thus, these novel biomaterials promise to be suitable for local cancer therapy.

**Keywords**: chitosan; ; ; ; , nitrosalicylaldehyde, hydrogel, biocompatibility, antitumor

## 1. INTRODUCTION

Hydrogels are a class of soft materials extensively employed in industrial and biomedical applications. Due to their high content of water and mechanical properties similar to the natural tissues – biocompatible hydrogels are at the forefront of materials designed for tissue engineering or drug carriers. One attractive direction of their bio-application is that of precision medicine and local therapy, in particular in the cancer therapy when injection at the tumour site minimizes the side effects (Ta, Dass & Dunstan, 2008; Hong, Yoo, Kim, & Lee,