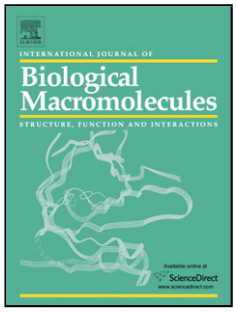

Title: Facile synthesis of chitosan/ZnO bio-nanocomposite hydrogel beads as drug delivery systems

Author: Mehdi Yadollahi Sana Farhoudian Soroush Barkhordari Iman Gholamali Hassan Farhadnejad Hamidreza Motasadizadeh Bezar

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Abstract

ZnO nanoparticles were synthesized *in situ* during the formation of physically crosslinked chitosan hydrogel beads using sodium tripolyphosphate as the cross-linker. The aim of the study was to investigate whether these nanocomposite beads have the potential to be used in drug delivery applications. The formation of ZnO nanoparticles (ZnONPs) in the hydrogels was confirmed by X-ray diffraction and scanning electron microscopy studies. SEM micrographs revealed the formation of ZnONPs with size range of 10–25 nm within the hydrogel matrix. Furthermore, the swelling and drug release properties of the beads were studied. The prepared nanocomposite hydrogels showed a pH sensitive swelling behavior. The ZnO nanocomposite hydrogels have rather higher swelling in different aqueous solutions in comparison with neat hydrogel. *In vitro* drug release test was carried out to prove the effectiveness of this novel type of nanocomposite beads as a controlled drug delivery system. A prolonged and more controlled drug releases were observed for ZnONPs containing chitosan beads, which increased by the increase in ZnONPs content.