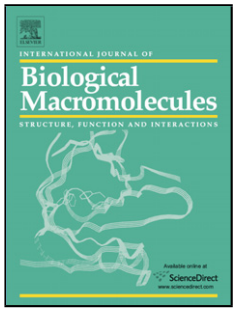

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One-pot synthesis of antibacterial chitosan/silver bio-nanocomposite hydrogel beads as drug delivery systems

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Abstract

Silver nanoparticles were synthesized in situ during the formation of physically cross-linked 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 silver nanoparticles (AgNPs) in the hydrogels was confirmed by X-ray diffraction and scanning electron microscopy studies. Furthermore, the antibacterial and swelling properties of the beads were studied. The nanocomposite hydrogels demonstrated good antibacterial effects against *Escherichia coli* and *Staphylococcus aureus* bacteria. AgNPs caused an increase in the swelling capacity of the beads. 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 AgNPs containing chitosan beads, which increased by the increase of AgNPs content.

Keywords: drug delivery, chitosan bead, silver nanoparticle, antibacterial, bio-nanocomposite