Photocrosslinked poly(vinyl alcohol)/chitosan hydrogel thin films for green synthesis of silver nanoparticles

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A series of hydrogel thin films based on poly(vinyl alcohol) (PVA) and Chitosan (CTS) were synthesized via ultraviolet (UV) irradiation using acrylic acid (AAc) monomer as crosslinker, without adding photoinitiator. The prepared hydrogels were used both as nanoreactors and immobilizing matrix for the formation of silver nanoparticles (AgNPs) through in situ reduction of silver nitrate by employing glucose and sodium hydroxide as a reducing agent and an accelerator, respectively. The characterization of hydrogel thin films containing AgNPs was carried out by UV-visible spectroscopy, X-ray diffraction (XRD) and Scanning Electron Microscope (SEM). It showed that highly stable and uniformly distributed AgNPs have been obtained over the entire hydrogel networks. The green synthesis method, nanoporous structure, well distributed AgNPs and biocompatible properties of the PVA/CTS-Ag hydrogel thin film could make it being a potential biomaterial for medical applications as wound dressing.

![Figure 1. Schematic illustration of in situ synthesis of silver nanoparticles onto the PVA/CTS hydrogel thin film; right: real image of S23-45/AgNPs hydrogel thin film.](image)

Keywords: Polyvinyl alcohol; Chitosan; Silver nanoparticle; Hydrogel thin films; Biomedical applications.

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