

In situ production of silver nanoparticle on cotton fabric and its antimicrobial evaluation

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Received: 10 August 2010 / Accepted: 22 September 2010 / Published online: 21 October 2010
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Abstract An ecological and viable approach for the in situ forming silver nanoparticles (AgNPs) on cotton fabrics has been used. Silver nanocoated fabric of brownish yellow color (AgNPs, plasmon color) was characterized by scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDS) and Fourier transform infrared spectroscopy (FTIR). SEM images revealed that the surface of the modified cotton was rougher than that of normal cotton. In addition, SEM images showed the presence of AgNPs on the surface of the treated fabric. Silver mapping and elemental analysis of the silver nanocoated cotton fabric using EDS confirmed the presence of AgNPs in a homogeneous distribution. Also, FTIR spectra of silver nanocoated sample showed more intense and broad peaks with a slight red shift if compared with those of blank sample indicating the

binding of AgNPs with cellulose macromolecules. Different coating levels and the impact of repeated washings have been evaluated against different microbial strains by growth inhibition zone. The results of antimicrobial studies reveal that the presence of a low coating level of nanosilver is enough for producing an excellent and durable antimicrobial cotton fabrics.

Keywords Nanotechnology · Glucose · Silver nanoparticles · Antimicrobial · Cotton fabric · In situ loading

Introduction

Particular attention is oriented nowadays about how to reduce or eliminate infections completely, especially those caused by antibiotic-resistant bacterial strains. These bacteria have been shown to have long survival times on commonly used hospital fabrics, such as hospital privacy drapes, scrub suits, and lab coats (Neely and Maley 2000; Slaughter et al. 1996). The survival and transfer of microorganisms between patients and health care workers have been documented (Lidwell et al. 1974; Ransjo 1979; Rubbo and Saunders 1963; Hambraeus 1973). The medical gowns and uniforms used currently have been proven to provide ineffective barriers for health care workers

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