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An Easy-Applicable Method for In situ Silver Nanoparticles Preparation into Wool Fibers

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Abstract : In this study, three different systems including room temperature, conventional water bath heating and microwave irradiation technique will be employed in the fabrication of silver nanoparticle-wool fibers. The silver nanoparticles will be synthesized in-situ incorporated into wool fibers under redox active bio-template of wool protein which facilitates the reduction of Ag+ to nanoparticulate Ag0. Silver NPs incorporated wool fiber will be characterized by scanning electron microscopy, energy dispersive X-ray, FTIR, TGA, silver content and X-ray photoelectron spectroscopy. The mechanism of binding Ag NPs in-situ incorporated wool fibers matrix will be discussed. The effect of silver nanoparticles on the coloration, antimicrobial, UV-protection and catalytic properties of the wool fibers will be evaluated. The overall results of this study indicate that the Ag NPs in-situ incorporated wool fibers will be applied as colorants for wool fibers with improving in its multi-functionality properties. So, this study provides a simple approach for innovative protein fibers design by applying the optical properties of Plasmonic noble metal nanoparticles.

Keywords : microwave irradiation technique, multi-functionality properties, silver nanoparticles, wool fibers
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