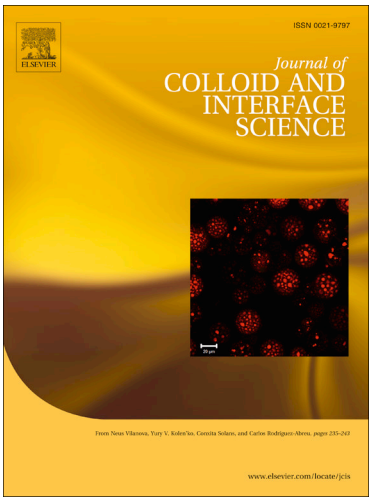

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ABSTRACT

A novel, one-pot method was developed to synthesize gold nanoparticle composite from cellulose (CEL), wool keratin (KER) and chloroauric acid. Two ionic liquids, butylmethylimmidazolium chloride and ethylmethylimmidazolium bis(trifluoromethylsulfonyl)imide were used to dissolve CEL, KER and $HAuCl_4$. X-ray diffraction and X-ray photoelectron results show that Au^{3+} was completely reduced to Au^0NPs with size of (5.5 ± 1) nm directly in the composite with $NaBH_4$. Spectroscopy and imaging results indicate that CEL and KER remained chemically intact and were homogeneously distributed in the composites with Au^0NPs. Encapsulating Au^0NPs into [CEL+KER] composite make the composite fully biocompatible and their bactericide capabilities were increased by the antibacterial activity of Au^0NPs. Specifically, the [CEL+KER+Au^0NPs] composite exhibits up to 97% and 98% reduction in growth of antibiotic resistant bacteria such as vancomycin resistant *Enterococcus* and methicillin resistant *S. aureus*, and is not cytotoxic to human fibroblasts. While [CEL+KER] composite is known to possess some antibacterial activity, the enhanced antibacterial observed here is due solely to added Au^0NPs. These results together with our previous finding that [CEL+KER] composites can be used for controlled delivery of drugs clearly indicate that the [CEL+KER+Au^0NPs] composite possess all required properties for successful use as dressing to treat chronic ulcerous infected wounds.