



Preparation and antimicrobial activity of ZnO-NPs coated cotton/starch and their functionalized ZnO-Ag/cotton and Zn(II) curcumin/cotton materials.

Issa M. El-Nahhal

Al-Azhar University, Palestine.

Abstract:

Keywords: ZnO-nanoparticles; starched cotton; ultrasonic irradiation; antimicrobial activity; ZnO/coated cotton-starch; curcumin complexes.

ZnO-NPs coated cotton or starched cotton fibers were successfully prepared via ultrasound irradiation. Different concentrations of soluble corn starch (1-3 starch wt.%) were used to stabilize ZnO-NPs onto the surface of cotton fabrics as entrapped species. The use of none-toxic biocompatible starch has improved the adhesion properties of the cotton fibers towards ZnO-NPs. This also enhanced the durability of ZnO-NPs onto the cotton fabrics and decreased their leaching from the surface of cotton fabrics. When 3 starch wt.% solution was used, deposition of ZnO-NP increased by 53% after 10 washing cycles. The antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* increased by 50 and 21.5%, respectively. Functionalization of ZnO coated cotton with silver nanoparticles (Ag-NPs) and curcumin results in formation of ZnO-Ag/cotton and Zn(II) curcumin/cotton composites. The functionalized nanocomposites ZnO-Ag coated cotton material showed a synergistic antimicrobial behavior than that of individual ZnO/cotton material. The Zn(II) curcumin complex coated cotton showed higher antibacterial activities against both *Staphylococcus aureus* (Gram-positive) and *Escherichia coli* (Gram-negative) bacteria than that of the ZnO/cotton material.

Acknowledgements: Asimul Islam acknowledges Jamia Millia Islamia for providing an excellent infrastructure to pursue research. This work was supported by the grants from the Indian Council of Medical Research (ICMR) BIC/12(16)/2014, and Science & Engineering Research Board (SERB), India (SR/FT/LS-48/2010).

Biography:

Professor Issa M El Nahhal has completed his his PhD in 1986 from University of Manchester, UK. He is work-



ing at Al Azhar University of Gaza, Palestine since 1992, Chemistry Department, He was a Fulbrighter in Colorado State University .USA,1993/94. He has supervised more than 30 MSc thesis and five PhD thesis. He has authored more than 100 scientific articles in high reputation international journals, he also published one book and one chapter. He has attended many local and international conferences. He reviewed many scientific papers for several international Journals. His research interest is in material science areas: Functionalized polysiloxanes, Sol-Gel encapsulation of PH indicators, Mesoporous silica materials and nanometal oxides coated cotton materials.

Publication of speakers:

1. A review on polysiloxane-immobilized ligand systems: synthesis, characterization and applications; IM El-Nahhal, NM El-Ashgar.
2. ynthesis & characterization of silica coated and functionalized silica coated zinc oxide nanomaterials; IM El-Nahhal, JK Salem, S Kuhn, T Hammad, R Hempelmann, S Al Bhaisi
3. Nano-structured zinc oxide-cotton fibers: synthesis, characterization and applications; IM El-Nahhal, SM Zourab, FS Kodeh, AA Elmanama, M Selmane, I Genois.
4. Structural characterization of immobilized-polysiloxane iminobis (N-diethylenediamineacetamide) ligand system; IM El-Nahhal, BA El-Shetary, AEKB Mustafa, NM El-Ashgar, J Livage.

Webinar on Nanotechnology and Nanomedicine, August 24, 2020, London, UK

Citation: Issa M. El-Nahhal; Preparation and antimicrobial activity of ZnO-NPs coated cotton/starch and their functionalized ZnO-Ag/cotton and Zn(II) curcumin/cotton materials, Palestine; Nanomedicine 2020; August 24, 2020; London, UK.