

SYNTHESIS OF NOVEL ZINC OXIDE NANOSTRUCTURES FOR MEDICINAL AND LUMINESCENT DEVICE APPLICATIONS

KHAN Aurangzeb, KHAN Saima Naz

University of Tabuk, Tabuk, Saudi Arabia

Abstract

We report the synthesis of the novel Zinc Oxide nanostructures such as Nanocubes, Nanodentrics, Nano-brushes, nano-hexagons, nano-combs via simple thermal evaporation and condensation method. The as-grown nanostructures are characterized by XRD, SEM integrated with EDS, TEM, Raman spectroscopy and Photoluminescence spectroscopy. XRD and Raman spectra reveals that all the structures in this study show good crystalline structures of the inner core, while the surface of the structures remains almost amorphous. Photoluminescence spectra study shows intense UV band-edge emission at 381 nm for the nano-cubes and nano-hexagons compared to the blue-green wide band while the later band is relatively intense for the nano-combs, nanodentrics and nano-brushes, which suggests that these different structures can be used for different luminescent devices application ranging from UV to visible. Further, these some of these nanoparticles are treated with Chitosan (biopolymer) at different temperature, forming chitosan/ZnO nanoparticles. Application of ZnO-chitosan nanostructures on cotton fabric conferred antibacterial and UV-protection properties. The UV testes with cotton fabrics show significant improvement in UV protection of finished cotton fabric with the increasing concentration of nanostructures of ZnO-chitosan

Keywords: ZnO, Nanostructures, TEM, UV, Chitosan

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