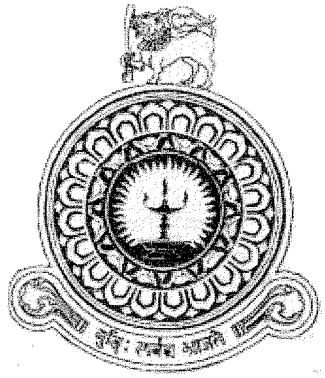

Synthesis, characterization and applications of Zinc oxide nanoparticles and their composites

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Abstract

Metal oxide nanomaterials have extensively been used in various applications; especially in water purification due to their ability to remove heavy metals by direct absorption. Our aim was to develop a low cost method to synthesis ZnO nanomaterials and to investigate the efficacy of ZnO nanoparticles in various applications.

The first part of the investigation was focused on developing a novel method to synthesis ZnO nanomaterial and characterization the same using Transmission Electron Microscopy (TEM). The materials synthesized were used for various applications. In addition, the nanoparticles have been impregnated into activated carbon to form a highly active nanocomposite for removal of heavy metals from potable water. The nanocomposites were made using both granular and powdered forms of activated carbon.

The main emphasize was to remove heavy metals such as lead, arsenic and cadmium using these nanocomposites. The adsorption studies and calculation of adsorption capacities were based on the Freundlich Isotherm. The nanocomposite was shown to remove arsenic and lead completely from contaminated water targeting the WHO limits for potable water. The study also revealed that this nanomaterial was not efficient in removing cadmium from drinking water.

The antifungal property of the ZnO nanomaterials was also investigated using skin fungi and studies proved that the material is active towards the fungi and can be developed as a material to control the fungi growth.