Title: Bio-mediated synthesis of ZnO nanostructures from Thymus Schimperi leaves extract and its antibacterial and photocatalytic activities

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ABSTRACT

In this work, zinc oxide nanostructures were synthesized from thymus schimperi leaves extract and ZnSO4.7H2O precursor, and antibacterial and photocatalytic activities were studied. The as-synthesized nanostructures were characterized by UV-Vis spectrophotometer, powder X-ray diffraction, Fourier transform infrared spectrophotometer and scanning electron microscopy. Powder X-ray diffraction patterns revealed that the as-synthesized zinc oxide was hexagonal wurtzite structure with no peaks from other phases or impurity. The maximum UV-Vis spectrum peak at about 255 nm also supports the evidence for the formation of zinc oxide nanostructures. The presence of functional groups on the surface of the nanostructures from the Fourier transform infrared spectrum exhibited that the phytochemicals play a key role in the formation of the nanostructures. The appearance of peak at 595cm-1 in the spectrum further corroborates the presence of zinc oxide in the sample. Scanning electron micrographs depict that there was mesh like nanostructures on the surface, which are likely to be convenient for catalytic application. The synthesized nanostructures inhibited the growth of both gram-positive and gram-negative bacteria, showing its biocidal property. Moreover, Congo red, which is one of the carcinogenic textile dyes, has been photodegraded by 83.33% at a pH of 6.5 due to the as-synthesized zinc oxide nanostructures indicating its potential application for waste water treatment.

Keywords: Photocatalysis; antibacterial activity; ZnO nanostructures; bio-mediated synthesis.

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