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Influence of Annealing Temperature on Optical, Anticandidal, Photocatalytic and Dielectric Properties of ZnO/TiO2 Nanocomposites

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Abstract : We have successfully synthesized ZnO/TiO2 nanocomposite using a two-step solochemical synthesis method. The influence of annealing temperature on microstructural, optical, anticandidal, photocatalytic activities and dielectric properties were investigated. X-ray diffraction (XRD) and scanning electron microscopy (SEM) show the formation of nanocomposite and uniform surface morphology of all samples. The UV-Vis spectra indicate decrease in band gap energy with increase in annealing temperature. The anticandidal activity of ZnO/TiO2 nanocomposite was evaluated against MDR C. albicans 077. The in-vitro killing assay revealed that the ZnO/TiO2 nanocomposite efficiently inhibit the growth of the C. albicans 077. The nanocomposite also exhibited the photocatalytic activity for the degradation of methyl orange as a function of time at 465 nm wavelength. The electrical behaviour of composite has been studied over a wide range of frequencies at room temperature using complex impedance spectroscopy. The dielectric constants, dielectric loss and ac conductivity (σac) were studied as the function of frequency, which have been explained by 'Maxwell Wagner Model'. The data reveals that the dielectric constant and loss (tanδ) exhibit the normal dielectric behavior and decreases with the increase in frequency.

Keywords : ZnO/TiO2 nanocomposites, SEM, photocatalytic activity, dielectric properties
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