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Green Synthesis of ZnO₂ Nanoparticles and Their Annealing Transformation Into ZnO Nanoparticles: Characterization and Antimicrobial Activity

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Abstract

Nanoparticles of ZnO₂ were synthesized through sol-gel technique using zinc acetate and hydrogen peroxide in aqueous solution exposed to UV irradiation and dried at 100 °C. Using electron microscope techniques, X-ray diffraction, Fourier transform infrared spectroscopy and thermogravimetric analysis we have studied in detail the structure and morphology of the obtained powders. With annealing treatment of the as-synthesized nanoparticles it was possible to achieve different crystalline structures from pure ZnO₂ to pure ZnO nanoparticles. Three different nanoparticles were selected: the as-synthesized nanoparticles obtained at 100 °C constituted by ZnO₂, the sample annealed at 160 °C composed by ZnO₂-ZnO mixture and the annealed sample at 220 °C constituted by pure ZnO. *Pseudomonas aeruginosa* was employed to evaluate the antimicrobial activity of three selected nanoparticle samples. The inhibition zone was largest for ZnO₂ nanoparticles.

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