

Preparation and characterization of Ni-doped ZnO thin films as photocatalysts in the degradation of organic dye

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Nanostructured ZnO thin films with different concentrations of Ni²⁺ doping (0, 1, 5, 10 and 15 wt%) are prepared by the sol gel method for the first time. The films comprise of ZnO nanocrystallites with hexagonal crystal structure, as revealed by means X-ray diffraction (XRD). The film surface is with characteristic ganglia-like structure as observed by Scanning Electron Microscopy (SEM). Furthermore, the doped films are tested with respect to the photocatalysis in aqueous solutions of malachite green upon UV-light illumination, visible light and darkness conditions. The thin films are prepared from Zn(CH₃COO)₂·2H₂O, 2-methoxyethanol and monoethanolamine on glass substrates using the dip coating technique. The initial concentrations of malachite green and the amount of catalyst are varied during the experiments. It is found that increasing of the amount of Ni²⁺ ions with respect to ZnO generally lowers the photocatalytic activity in comparison with the pure ZnO films. Nevertheless, all films exhibit a substantial activity in both visible light and darkness, which is promising for the development of new ZnO photocatalysts by the sol-gel method.