

Effect of Precursors Aging Time on the Photocatalytic Activity of ZnO Thin Films

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Abstract : Thin ZnO films are deposited on glass substrates via sol-gel method and dip-coating. The films are prepared from zinc acetate dehydrate as a starting reagent. After that the as-prepared ZnO sol is aged for different periods (0, 1, 3, 5, 10, 15, and 30 days). Nanocrystalline thin films are deposited from various sols. The effect ZnO sols aging time on the structural and photocatalytic properties of the films is studied. The films surface is studied by Scanning Electron Microscopy. The effect of the aging time of the starting solution is studied in respect to photocatalytic degradation of Reactive Black 5 (RB5) by UV-vis spectroscopy. The experiments are conducted upon UV-light illumination and in complete darkness. The variation of the absorption spectra shows the degradation of RB5 dissolved in water, as a result of the reaction occurring on the surface of the films, and promoted by UV irradiation. The initial concentrations of dye (5, 10 and 20 ppm) and the effect of the aging time are varied during the experiments. The results show, that the increasing aging time of starting solution with respect to ZnO generally promotes photocatalytic activity. The thin films obtained from ZnO sol, which is aged 30 days have best photocatalytic degradation of the dye (97,22%) in comparison with the freshly prepared ones (65,92%). The samples and photocatalytic experimental results are reproducible. Nevertheless, all films exhibit a substantial activity in both UV light and darkness, which is promising for the development of new ZnO photocatalysts by sol-gel method.

Keywords : ZnO thin films, sol-gel, photocatalysis, aging time

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