

Abstract

ZnO thin films were prepared by sol-gel dip coating method onto glass substrates. The effects of aging time of the starting solution (2, 10 and 30 days) and the number of coats (2, 5 and 10 coatings) on structural, morphological and optical properties were investigated. Photocatalytic efficiency was also assessed. X-ray diffraction analysis indicates that all the films exhibit a Zincite-type structure with a preferred grains orientation along the [002] direction. The preferred orientation factor (POF) increases with aging time while the crystallite size decreases. The field emission scanning electron microscopy observations reveals nanorods morphology. The length of ZnO nanorods increase with increasing number of layers whereas their length decreases as a function of aging time while adopting a random orientation. A high optical transparency is observed for all ZnO thin films, ranging from 90 up to 96%. Methylene Blue (MB) dye photocatalytic degradation was found increases with aging time, reaching almost 94% after 10 h under UV irradiation. The apparent reaction rate (K_{app}) obtained by Langmuir-Hinshelwood model increases with increasing aging time from, from 0.218 h^{-1} for 2 days to reach a steady state around 0.270 h^{-1} . Nevertheless, a small variation of K_{app} was recorded when varying the number of coats; $0.223\text{-}0.226 \text{ h}^{-1}$.