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INFLUENCE OF THE GLASS AND POLYMERIC NANOSTRUCTURED MATERIAL SUBSTRATE ON ZNO THIN FILMS DEPOSITED BY THE SILAR METHOD AND THEIR ANALYSIS IN PHOTODEGRADATION.

The degradation by using catalysts, especially metal oxides as thin films has been recently a novel method for proper treatment of air and water contamination. Additionally, the thin films deposited on flexible substrates provide light weight, easy bending, and low-cost processing. The zinc oxide (ZnO) as a p-type semiconductor with a direct bandgap energy of 3.3 eV is a promising material for photocatalytic activity, which it makes it active under UV-Vis light irradiation, for this reason, the influence of the substrate on ZnO thin films has been studied on the degradation of methylene blue. In the present work, ZnO thin films were deposited on glass, and polymeric nanostructured materials (polyethylene/graphene) substrates using the Successive Ionic Layer Adsorption and Reaction (SILAR) method. This method involves sequential immersions of the desired substrate in different cationic and anionic precursor solutions, getting a cycle of ion adsorption, rinsing, reaction, and other rinsing. The cationic precursor consists of ZnSO4, complexed with triethanolamine (TEA), the anionic precursor was hot deionized water at 90℃, and deionized water for rinsing. Structural, morphological, and optical properties were analyzed using X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), and Ultraviolet-Visible Spectroscopy (UV-Vis), respectively, where the ZnO has a hexagonal phase formation with grain sizes in the order of 36.8-48.7 nm, bandgap values around 2.77-3.7 eV, and homogenized surface over the different substrates. The photocatalytic evaluation was performed by considering ZnO thin films deposited on the different substrate (glass or nanostructured polymer).

Keywords

Photodegradation, zinc oxide, SILAR, nanostructured polymer, sustainability.

Reference

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