The Effects of Hydrogen Peroxide and Deposition Temperature on the electrodeposited Zinc Oxide Film

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Zinc oxide (ZnO) film was successfully electrodeposited on a substrate of indium-tin oxide (ITO) by reduction of zinc chloride. It was found that both the content of hydrogen peroxide and the electrodeposition temperature dominated the microstructure variation and its optical properties. The morphology of ZnO film revealed different growth mechanism, i.e. film with large flake-like crystal without H₂O₂ in contrast to the fine surface with H₂O₂ included. During electrodeposition, organometallic compound, Zn₅(OH)₈·H₂O, co-precipitated on the electrode which was depressed by hydrogen peroxide (H₂O₂) and burn-out in an annealing process. Besides, H₂O₂ could result of crystal defects in ZnO to produce new doped-energy level, E_d, and thus reduce the photon energy as a red-shift. On the other hand, the under substrate could affect the transmittance to induce blue-shift caused by the lattice distortion at the interlayer, ZnO/ITO.

Keywords: zinc chloride, hydrogen peroxide, microstructure variation, doped-energy level

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