Optical and electrical properties of transparent conducting Zinc Oxide.

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ABSTRACT

This experiment is based on electroless plating method, the glass substrates must be sensitized and activated by using stannous chloride and palladium chloride in aqueous solution, respectively. Therefore, the smooth glass surface covered with palladium atoms, then the zinc oxide thin film will grow on the glass substrates in zinc nitrate and dimethylamine borane mixed aqueous solution. Changes in zinc nitrate aqueous solution and dimethylamine borane concentration, as well as the solution of the reaction temperature and changing the annealing temperature and activation and sensitization times, etc., to explore the properties of zinc oxide thin films. Identify the films by using optical microscopy, X-ray diffraction, optical spectroscopy, and semiconductor parameter analyzer with four-point probe, then the structure, transmittance, and resistivity of zinc oxide thin films are obtained. The experimental results showed that the lowest dissolved oxygen in deionized water is about 1.1 mg/L. The lowest resistivity of zinc oxide thin film was obtained the following experimental conditions: the process time of activation and sensitization are all 2 minutes and the process was repeated 3 times, the zinc oxide was growth in the mixed dimethylamine borane and zinc nitrate aqueous solution at 35?aC, annealing at 550?aC under 3% hydrogen and argon mixture gas. The zinc oxide thin films annealed at 500?aC and 600?aC, the resisivity is higher. Especially, the zinc oxide thin film was growth in 0.075 M zinc nitrate mixed with 0.01 M dimethylamine borane aqueous solution, the resistance value can be about 75 kΩ by using the four-point probe measurement, and through the formula R = ρ L/A, the measured resistivity of films is about 7.5 ? Pcm

Keywords : electroless plating, zinc oxide

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