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Electrochemical, Structural, and optical properties of SnO₂ thin films

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ABSTRACT

SnO₂ thin films were electrodeposited on fluorine tin oxide substrate in nitric acid solution. The potential was swept from -0.4 to -1.6V with a rate of 50 mV/s. The films were found uniform, adherent to the substrate and amorphous. The XRD patterns reveal that after heat treatment at 500 °C for 1h, the films turn out to be crystalline in nature. Indeed, the film becomes composed of SnO₂ nanocrystallite with a cassiterite tetragonal structure. The nanocrystallite size is about 50 nm. The films thickness was found to be approximately 592nm and 563 nm for asdeposited and heat-treated SnO₂ thin films, respectively. Some optical parameters of these films such as refractive index (n), extinction coefficient (k), absorption coefficient (α) and band gap were studied.

Index Terms— Thin films; Optical properties; band gap; electrodeposition , cyclic voltammetry,