

Study of the morphological and optical properties of transparent electrodes based on indium tin oxide (ITO) for photovoltaic applications

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Abstract : Metal oxides are materials which may have the dual property of having a high electrical conductivity and good transparency in the visible range. They are called "transparent conductive oxides" TCO. The indium oxide ITO (indium tin oxide) is usually used as a transparent electrode as for the third generation solar cells. This work is devoted to the realization and characterization of transparent electrodes based on thin films of indium oxide doped with tin (ITO), which are deposited on a glass substrate by the method of spin-coating. After chemical treatment in specific locations we performed different characterizations. Optical characterization of transparent electrodes developed allowed us to deduce the various optical parameters such as transmission (170-2100 nm), the energy gap and extinction coefficient as a function of the thickness and the spectroscopic determination the refractive index n thanks to ellipsometry measurements. The AFM measurements characterize the surface topology of material and provide information in particular on the surface roughness and the grain size of the material studied. These measurements are performed using an atomic force microscope mode functioning contact. The obtained results on the preparation and characterization of transparent electrodes based on indium oxide ITO, shows that the ITO thin film has good transparency to visible light and also exhibits good conductivity thereby used as the transparent electrodes.

Keywords : transparent electrodes, ITO, thin film