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**Correlation of the optical, electrical and morphological properties of ITO layer grown by DC pulsed magnetron sputtering with process parameters.**

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There is a strong demand for deposition on ITO layers as transparent electrodes for many optoelectronics devices. Magnetron sputtering is the most widely used fabrication methods for these layers. Despite these layers are already manufactured at industrial scale, to obtain stable film properties for large area with exceptionally low resistivity and high transmittance in the visible range it is still a challenge. This is due to the strong dependence of the ITO films properties on sputtering process parameters. There are many partial studies regarding the influence of some sputtering parameters on the properties of ITO films. However a deep study encompassing the main sputtering process parameters and correlating these parameters with the optical, electrical and morphological properties is still missing for industrial size magnetron sputtering equipment. In this work we deeply analysis the influence of the process pressure, oxygen flow, substrate temperature and thermal annealing treatment on the optical, electrical and morphological properties to further understand the nature of the conducting properties of ITO layers. The main objective is to design an industrial deposition process stable for large coating areas.

An industrial magnetron sputtering deposition equipment has been used to deposit 140 nm ITO films on microscope slides. An ITO ceramic target ( $\text{In}_2\text{O}_3/\text{SnO}_2$  90/10 wt%) of 550'125 mm size with an unbalanced magnetron evaporator was used. The power source was dual output pulsed-DC (5 to 350 kHz) from AEI Pinnacle Plus + 5/5 kW.

**Keywords**

Transparent Conductor Materials

Magnetron Sputtering

Optical Properties

Electrical Properties

Morphological Properties