

**Preparation and Characterization of Tin Oxide Film  
Deposited by Ion-Assist-Deposition(IAD)**

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Tin oxide film( $\text{SnO}_{2-x}$ ) has been attracting material since it has great importance in wide range of application such as solar cells, gas sensor and optoelectric and photovoltaic device. The high conductivity of tin oxide film has been attributed to substitutional tin or /and oxygen vacancies. Therefore the exact control of composition of tin oxide film has been necessary.

In this work, tin oxide films were deposited on Si(100) and glass substrates by ion-assist-deposition(IAD). The composition of tin oxide films was controlled by average energy of tin atoms. The effect of annealing on tin oxide films was investigated according to temperature and average energy. The change of properties of tin oxide films was characterized with a variety of analytical techniques.

Neutral tin atom is evaporated with assisting ionized oxygen gas in high vacuum condition at a pressure of  $8\sim 9 \times 10^{-5}$  Torr. Oxygen gas is ionized and accelerated by cold-cathode type ion gun at oxygen flow rate of 3.0 sccm( $ml/min.$ ). Average depositing energy in the deposition process is changed by energy of ionized oxygen gas and is varied in a range 0 to 125 eV with changing discharge potential of oxygen ion. The as-deposited films were annealed at 300 °C and 500 °C respectively. The as-deposited and annealed films were analyzed by X-ray, AES, XPS, AFM and RBS.