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DEVELOPMENT OF ZINC TIN OXIDE (ZTO) FILMS DEPOSITED BY SPRAY PYROLYSIS METHOD

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ZTO has drawn great research interest due to its good characteristics such as high stability and attractive optical properties [1]. ZTO has been used in the fields of solar cell [2], lithium battery [3], gas sensor [4] and photocatalyst [5]. There are a number of methods for producing ZTO, such as spray pyrolysis, chemical vapor deposition, hydrothermal.

ZTO precursor solution was prepared by dissolving zinc acetate ($Zn(CH_3COO)_2 \cdot 2H_2O$) and tin chloride ($SnCl_4 \cdot 5H_2O$) in two solvents: ethanol and water (Zn/Sn ratio=2). The ZTO films are deposited onto the glass substrates using the spray pyrolysis method (Fig.1a), followed by annealing at 400 °C for 4 h in ambient air.

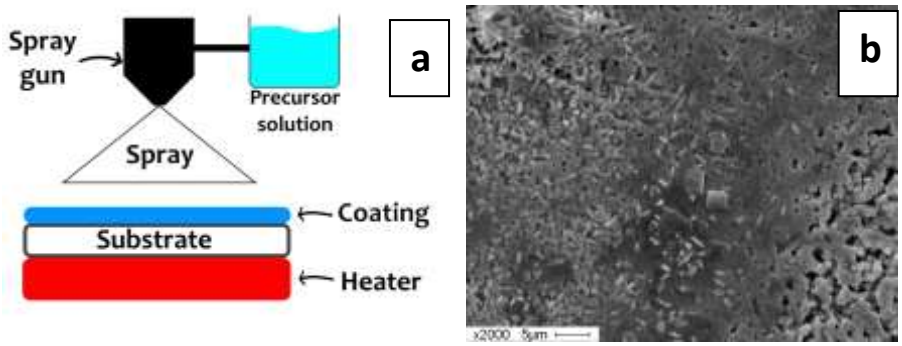

Fig.1. (a) Schematic view of the fabrication process of sprayed-coating, (b) SEM image of ZTO film

Microstructures of ZTO films having moderately packed grains with different grain sizes as shown in Fig. 1b. Increasing the substrate temperature, morphology of the samples becomes rougher. At lower substrate temperatures ZTO films show the particulate structure. In the film deposited at higher temperature the overgrown particles can be seen. The increase in the particle size with substrate temperature is due to the rapid formation of the grains due to the faster reaction rate at high temperature. The volatility of the solvent also affects the structure of the coating

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