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Effect of process parameters of antimony doped tin oxide films prepared on flexible substrate at room temperature

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Transparent conducting oxide (TCO) films are widely used as transparent conducting thin film material for application in various fields such as solar cells, optoelectronic devices, heat mirrors and gas sensors, etc. Recently the increased utilization of many transparent electrodes has accelerated the development of inexpensive TCO materials. Indium tin oxide (ITO) film is well-known for TCO materials because of its low resistivity, but there is disadvantage that it is too expensive. ZnO film is cheaper than ITO but it shows thermally poor stability. On the contrary, antimony-doped tin oxide films (ATO) are more stable than TCO films such as Al-doped zinc oxide (AZO) and ITO. Moreover, SnO2 film shows the best thermal and chemical stability, low cost and mechanical durability except the poor condutivity. However, annealing is proved to improve the conductivity of ATO film. Therefore, in this work, antimony (6 wt%) doped tin oxide films to improve the conductivity were deposited on 7059 corning glass by RF magnetron sputtering methodfor the application to transparent electrodes. In general, of all TCO films, glass is the most commonly selected substrate. However, for future development in flexible devices, glass is limited by its intrinsic inflexibility. In this study, we report the growth and properties of antimony doped tin oxide (ATO) films deposited on PES flexible substrate by using RF magnetron sputtering. The optimization process was performed varying the sputtering parameters, such as RF power and working pressure, and parameter effect on the structural, electrical and optical properties of the ATO films were investigated.