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## Characteristics of Tin Oxide( $\text{SnO}_2$ ) Thin Film Deposited by the Ionized Cluster Beam(ICB)

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### ICB 방법에 의해 제작된 tin oxide( $\text{SnO}_2$ ) 박막의 특성 연구

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The ICB source for  $\text{SnO}_2$  thin film deposition is designed and constructed. Its characteristics is investigated as Sn metal is deposited with  $\text{O}_2$  atmosphere. The ejection angle of ionized cluster beam from the nozzle center is measured by about  $8^\circ$  and the maximum current density of ionized cluster beam is attained at the deposition rate of  $0.4\text{\AA}/\text{sec}$ . We also desposited  $\text{SnO}_{2-x}$  thin film using  $\text{SnO}_2$  powder(Aldrich Chem. Co. 99.995+%) with the variation of accelerating voltage for ionized cluster beam and the flow rate of  $\text{O}_2$  reaction gas. The morphology, crystal structure and stoichiometry of deposited thin film were studied by scanning electron microscope, x-ray diffraction, X-ray photoemission spectroscopy and atomic force microscope, *etc* in this experiment.