

DC/RF 스퍼터링에 의한 p형 투명 전도성 CuGaO₂ 박막의 제조

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Preparation of p-type transparent conducting CuGaO₂ thin film by DC/RF sputtering

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Abstract : P-type transparent conducting CuGaO₂ thin films have been prepared by DC/RF sputtering using quartz(0001) and sapphire(0001) substrates. The target was fabricated by heating a stoichiometric mixture of CuO and Ga₂O₃ at 1373K for 12h under N₂ atmosphere. The film were deposited under mixture gas of Ar and O₂(Ar:O₂=4:1) during 10~30min, and the as-deposited films were annealed at 1123K and N₂ atmosphere. Room temperature conductivity and the activation energy of the sintered body in the temperature range of 223K ~ 423K were 0.004S/cm, 1.9eV, respectively. XRD revealed that all of the as-deposited films were amorphous. Heating of the films deposited on quartz substrates above 1123K resulted in crystallization with a second phase of CuSiO₃, which was assumed owing to reaction with quartz substrate. The single phase of CuGaO₂ was obtained at the film deposited on the sapphire substrates. The transmittance after annealing of DC- and RF-sputtered films were 55~75% at 550nm. From the transmittance and reflectance measurement, the direct band gap of the DC/RF-sputtered films were 3.63eV and 3.57eV, and there was little difference between DC and RF sputtered films.

Key Words : p-type, Transparent conducting oxide, Thin film, Delafossite, CuGaO₂,