

마그네트론 스퍼터를 이용한 Ar 가스 유량 조절에 따른 GZO의 특성 변화

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Effect of Ar Flow Ratio on the Characteristics of Ga-Doped ZnO Grown by RF Magnetron Sputtering

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The structural, optical, and electrical properties of Ga-doped ZnO (GZO) thin films on glass substrates grown by radio-frequency(RF) magnetron sputtering were investigated. The flow ratio of Ar was varied as a deposition parameter for growing high-quality GZO thin films. The structural properties and surface morphologies of GZO were characterized by the X-ray diffraction. To analyze the optical properties of GZO, the optical absorbance was measured in the wavelength range of 300-1100 nm by using UV-VIS spectrophotometer. The optical transmittance, absorption coefficient, and optical bandgap energy of GZO thin films were calculated from the measured data. The crystallinity of GZO thin films is improved and the bandgap energy increases from 3.08 to 3.23eV with the increasing Ar flow ratio from 10 to 100 sccm. The average transmittance of the films is over 88% in the visible range. The lowest resistivity of the GZO is $6.215 \times 10^{-4} \Omega\text{-cm}$ and the hall mobility increases with the increasing Ar flow ratio. We can optimize the characteristics of GZO as a transparent electrode for thin film solar cells by controlling Ar flow ratio during deposition process.

Key words : RF magnetron sputtering, GZO, ZnO, sputtering, Ga-doped

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실리콘 태양전지 모듈의 two-mode failure 모델의 연구

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A Study of Two-Mode Failure Model for Crystalline Si Photovoltaic Module

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To guarantee 20-25 years to the lifetime of the PV modules without failure, reliability test of the module is very important. Field-aged test of the outdoor environment is required. However, due to time constraints, accelerated testing is required to predict the lifetime of PV modules and find causes of failure. Failure is caused by many complex phenomena. In this study, we experimented two accelerated tests about corrosion and fatigue, respectively. First, temperature cycling test for fatigue were tested and Coffin-Manson equation was analyzed. Second, damp heat test for corrosion were tested and Eyring equation were analyzed. Finally, using two-mode failure model, we suggest a new lifetime model that analyze the phenomenon by combining two kinds of data.

Key words : Failure mode(고장모드), Thermal cycling test(온도싸이클 시험), Damp heat test(고온고습 시험)

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