

INFLUENCE OF O₂ PLASMA TREATMENT ON H₂ POST-TREATED BZO THIN FILMS FOR TCO OF a-Si SOLAR CELL

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In order to achieve a high efficient a-Si solar cell, the TCO (transparent conductive oxide) substrates are required to be a low sheet resistivity, a high transparency, and a textured surface with light trapping effect. Recently, a zinc oxide (ZnO) thin film attracts our attention as new coating material having a good transparent and conductive for TCO of solar cells^{1,2}.

In this work a study of the influence of O₂ plasma treatment on the properties of H₂ post-treated BZO (boron doped zinc oxide, ZnO:B) thin films is presented. The BZO thin films prepared by MOCVD (Metal Organic Chemical Vapor Deposition) are investigated and the samples of H₂ post-treated BZO thin film are tested with O₂-plasma treatment. The BZO thin films treated by O₂-plasma have been experimented with different RF power and pressure in the RF plasma treatment system with 13.56 MHz as RIE (Reactive Ion Etching) type. We measured the optical, electrical properties and surface morphology of BZO thin film with and without O₂-plasma treatment. The surface morphology and the optical properties such as the transmittance, reflectance and haze of BZO thin films are evaluated with SEM (Scanning Electron Microscopy) and with the integrating sphere and ellipsometer. The electrical properties such as conductivity, sheet-resistance and work function are measured with 4-point probe system and surface analyzer. The result show that the influence of O₂ plasma treatment on the H₂ post-treated BZO thin films has an important role in the changes observed in the optical, electrical properties and surface morphology. Regarding the results of the O₂-plasma treatment BZO thin films are applicable to the TCO for solar cells, such as the a-Si thin film solar cell and organic solar cell, and the interlayer of tandem structure solar cell.

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