

Development of Inorganic CuO/ZnO Based Solar Cell Using Various Cell Structures by RF Magnetron Sputter

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Herein, we investigated inorganic ZnO/CuO based solar cells using various cell structures. In a typical device fabrication CuO and ZnO heterojunction solar cells were fabricated on indium tin oxide (ITO)-coated glass substrate (bottom electrode). High-quality, pure and well-crystalline ZnO films were deposited by RF magnetron sputter and plasma enhanced atomic layer deposition (ALD). Moreover, ZnO nanorods were grown by simple solution process using zinc nitrate hexahydrate and hexamethylenetetramine (HMTA). Deposition of uniform CuO films was achieved by RF magnetron sputter at room temperature using copper target under O₂ and Ar mixture gas flow. Furthermore, upper electrode of metal contact has been done by RF magnetron sputter using Ag target. The as-fabricated CuO/ZnO solar cells structures have been analyze by field emission electron microscope, X-ray diffraction, UV-vis spectroscopy, etc. The best conversion efficiency of 0.11% was obtained from a CuO/N-doped ZnO/ALD deposited-ZnO heterojunction solar cell fabricated on ITO glass with V_{OC}=0.46 V, J_{SC}=0.76 mA/cm² and fill factor of 31.01% under AM 1.5G illumination.