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Zn(O,S) Thin Films Deposited by Pulse–DC Magnetron Sputtering for an Alternative Cd-Free Buffer Layer

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Zn(O,S) thin films were deposited on glass substrates using pulse DC magnetron sputtering for 60 minutes. The sputtering power was varied from 70 to 100 W with oxygen reactive gas from 0 to 5 sccm at a constant pulse frequency of 200 kHz at room temperature. The optical properties of Zn (O,S) thin films was characterized by using UV-Visible spectroscopy, the thickness and composition of films were analyzed by Dektak profile and electron probe microanalysis (EPMA). The morphology of films were characterized using atomic force microscopy (AFM) and field emission scanning electron microscopy (FESEM). The transmittance of all specimens were higher than 80% in the wavelength between 300 nm to 900 nm. Optical band gap of Zn (O,S) thin films varied between 3.5 eV to 4.1 eV. The RMS roughness decreases from about 40 nm to about 15 nm when the sputtering power increase from 70 W to 100 W. The composition of Zn (O,S) thin film showed the increase of oxygen content when increasing oxygen reactive gas. The increase of oxygen content increased transmittance of the specimens. Also, the samples with low sputtering power condition contained higher atomic percentage of oxygen than those with high sputtering power. The composition of Zn(O,S) thin film for alternative Cd-free buffer layer can be varied using this proposed method.

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