Study on the ZnO-based buffer and window layer for the Sn based solar cells application

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In this study, a high quality ZnMgO and ZnO film was deposited using an RF magnetron sputtering as buffer layer and a window layer for solar cell application. The properties of these films were studied as a function of substrate temperature in the range of room temperature (R.T) - 500 ℃. The elemental composition and electronic state of the constituent elements was studied using X- ray photoelectron spectrometry for the grown layers. The deposited ZnMgO thin film showed hexagonal structure with the orientation of (002) and (103) at lower substrate temperatures (R.T to 250 ℃) and the deposited films ≥ 300 ℃ was found to be amorphous nature. The films deposited at room temperature showed (002) as preferred orientation and thereafter it was changed to (103) orientation. All the films showed optical transmittance ~ 90 %. ZnO layer exhibited hexagonal structure with (103) as preferred orientation up to 200 ℃ and thereafter is was changed as (002). Therefore ZnMgO and i-ZnO thin film is expected to serve as a buffer and window layer for solar cells.