The hydrogenated amorphous silicon (a-Si:H) thin film solar cells using n/Al or n/Ag/Al back reflector have low short circuit current (Jsc) due to high absorption coefficients of Al or work function difference between n-layer and the metal. In this article, we utilized aluminum doped zinc oxide (AZO) to raise the internal reflectance for the improvement of short current density (Jsc) in a-Si:H thin film solar cells. It was found that there was a slight increase in the reflectance in the long wavelength range at the process temperature of 125°C due to improved crystalline quality of the AZO back reflector. The optical band gap (Eg) and work function were affected by the temperature and so did the internal reflectance. The increased internal reflectance within the solar cell resulted in Jsc of 14.94 mA/cm² and the efficiency of 8.84%. Jsc for the cell without back reflector was 12.29 mA/cm².

**Keywords:** AZO, thin film solar cell, back reflector, low temperature, sputtering