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## The ZnS Film Deposition Technology for Cd-free Buffer Layer in CIGS Solar Cells

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The CIGS Solar Cells have the highest conversion efficiency in the film-type solar cells. They consist of p-type CuInSe<sub>2</sub> film and n-type ZnO film. The CdS films are used as buffer layer in the CIGS solar cells since remarkable difference in the lattice constant and energy band gap of two films. The CdS films are toxic and make harmful circumstances. The CdS films deposition process need wet process.

In this works, we design and make the hitter and lamp reflection part in the sputtering system for the ZnS films deposition as buffer layer, not using wet process. Film thickness, SEM, and AFM are measured for the uniformity valuation of the ZnS films. We conclude the optimum deposition temperature for the films uniformity less than 1.6%. The ZnS films deposited by the sputtering system are more dense and uniform than the CdS films deposited by the Chemical Bath Deposition Method(CBD) for the CIGS Solar Cells.

**Keywords:** ZnS film, CIGS solar cell, sputtering, uniformity, SEM, AFM