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# Structural and Optical Properties of Copper Indium Gallium Selenide Thin Films Prepared by RF Magnetron Sputtering

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$Cu(In_xGa_{1-x})Se_2$ (CIGS) thin film solar cell is one of the most promising solar cells in photovoltaic devices. CIGS has a direct band gap which varied from 1.0 to 1.26 eV, depending on the Ga to In ratio. Also, CIGS has been studying for an absorber in thin film solar cells due to their highest absorption coefficient which is 1 x $10^5$ $cm^{-1}$ and good stability for deposition process at high temperature of 450～590°C. Currently, the highest efficiency of CIGS thin film solar cell is approximately 20.3%, which is closely approaching to the efficiency of poly-silicon solar cell.

The deposition technique is one of the most important points in preparing CIGS thin film solar cells. Among the various deposition techniques, the sputtering is known to be very effective and feasible process for mass production. In this study, CIGS thin films have been prepared by rf magnetron sputtering method using a single target. The optical and structural properties of CIGS films are generally dependent on deposition parameters. Therefore, we will explore the influence of deposition power on the properties of CIGS films and the films will be deposited by rf magnetron sputtering using CIGS single target on Mo coated soda lime glass at 500°C. The thickness of CIGS films will be measured by Tencor-P1 profiler. The optical properties will be measured by UV-visible spectroscopy. The crystal structure will be analyzed using X-ray diffraction (XRD). Finally the optimal deposition conditions for CIGS thin films will be developed.

**Keywords:** $Cu(In_xGa_{1-x})Se_2$, thin film solar cell, absorber layer, rf magnetron sputtering