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**Exploration of Al-Doped ZnO in Photovoltaic Thin Films**

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The electrical properties of Al doped ZnO-based thin films represent a potential advancement in the push for increasing solar cell efficiency. Doping with Aluminum will theoretically decrease resistivity of the film and therefore achieve this potential as a viable option in the P-N junction phase of photovoltaic cells. The n-type semi-conductive characteristics of the ZnO layer will theoretically be optimized with the addition of Aluminum carriers. In this study, Aluminum doping concentrations ranging from 1-3% by mass were produced, analyzed, and compared. Films were developed onto ITO coated glass using the Pulsed Laser Deposition technique. Target thickness was 250 nm and ellipsometry measurements showed uniformity and accuracy in this regard. Active dopant concentrations were determined using Hall Effect measurements. Efficiency measurements showed possible applications of this doped compound, with upwards of 7% efficiency measured, using a Keithley 2602 SourceMeter set-up. XRD scans showed highly crystalline structures, with effective Al intertwining of the hexagonal wurtzite ZnO molecular structure. This alone indicates a promising future of collaboration between these two materials.

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