

IS IT POSSIBLE TO GROW STABLE P-TYPE CDS LAYERS SUITABLE FOR FABRICATION OF ELECTRONIC DEVICES?

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Abstract: CdS is a technologically important wide bandgap window material with some unique properties showing highest conversion efficiencies in thin film solar cells based on CdTe and CuInGaSe₂ absorber materials. n-CdS/CdTe and n-CdS/CuInGaSe₂ hetero-interfaces based solar cells have demonstrated 18.7% and 20.3% lab-scale solar cell efficiencies to date. Both these devices are fabricated based on n-type CdS window material. Recent work on graded bandgap devices using p-type AlGaAs window materials experimentally demonstrated highest V_{oc} values of 1175 mV together with highest possible FF values ~ 0.85 , and therefore if p-CdS can be grown, it provides another route to improve solar cell efficiencies and open doors for many other electronic devices. There are several attempts to grow Cu-doped p-CdS in the literature but the follow-up research work or devices based on p-CdS are scarce. In this research programme of solar energy materials development, using electrochemical growth method, p-type CdS was observed for certain layers. However, the stability of p-type CdS is found to be weak and these results are presented and discussed in this paper.

Keywords: Electrodeposition, p-CdS, n-CdS