Interrelation of CdTe grain size, post-growth processing and window layer selection on solar cell performance

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This work studies three different device architectures in parallel, allowing for an in-depth comparison of processing conditions for CdTe solar cells grown on CdS, SnO2 and CdSe coated substrates. Direct replacement of the CdS window layer with a wider band gap SnO2 layer is hindered by poor growth of the absorber, producing highly strained CdTe films and a weak junction. This is alleviated by inserting a CdSe layer between the SnO2 and CdTe, which improves the growth of CdTe and results in a graded CdSexTe1-x absorber layer. For each substrate, the CdTe deposition rate and post growth chloride treatment is systematically varied, highlighting the distinct processing requirements of each device structure.