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Plasma and Thermal Assisted Selenization for Preparation of CuInGaSeS absorber film ZEHR A CEVHER, ZHI HUANG, REN YUHANG, Hunter College, City University of New York — Cu(In,Ga)Se semiconductor alloys have been the center of attention over the past decades to potentially replace high efficient silicon based photovoltaic devices. In order to improve the conversion efficiency of CuInGaSe photovoltaic devices, the CuInGa precursor film along with a suitable selenization technique must be enhanced. We demonstrate the plasma assisted selenium cracking technique and thermal assisted selenium cracking by radio frequency plasma or increased temperature and the deposition of a selenium cap layer above CuInGa metallic precursors. The two stage plasma enhanced selenization process includes the modification of the ionization state of the Se species by radio frequency plasma and the deposition of a selenium cap layer above CuInGa precursors and thermal assisted selenization includes cracking large selenium molecules without further modification during selenization. Improved homogeneity and crystallization is realized in both techniques as opposed to conventional selenization procedure. The result is explained by the enhancement of reaction kinetics between the reduced Se phase and metallic precursor layers. We further demonstrate improvement in CIGS film morphology using sulfurization technique.

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