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PLD growth of thin film Zinc Phosphide RAJESH VADDI, PARAG VASEKAR, CHARLES WESTGATE, BRUCE WHITE, Binghamton University - State University of New York — The development of efficient, low cost solar cells to meet society's growing energy needs has triggered tremendous interest in developing photovoltaics formed from earth abundant materials. Zinc phosphide (Zn3P2) is a promising earth abundant absorber layer for photovoltaic energy conversion with a nearly ideal band gap (1.5eV) and a large absorption coefficient of 10^4/cm. In this work we examine the growth parameters, electrical and optical properties of thin film zinc phosphide produced using pulsed laser deposition (PLD) from a zinc phosphide target at laser fluencies ranging from 1-3 J/cm2. For the laser fluences explored, highly resistive amorphous zinc phosphide thin films were produced with a band gap of approximately 1.7 eV. The thin films could be transformed from amorphous to polycrystalline zinc phosphide by annealing at 400C for 15mins in a N2 atmosphere. High resolution X-ray photoelectron spectroscopy (XPS) is used to examine the binding energies of Zn 2p3/2 and Phosphorous 2p3/2 signals and are in the range of 1021.6 eV and 127.5 eV. Energy Dispersive X-ray Spectroscopy (EDAX) revealed that the Zn3P2 thin films are nearly stoichiometric in composition. Hall mobility in these materials and Zn3P2/ZnS hetrojunction solar cell performance will be discussed.

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