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Ultra-Smooth ZnS Films Grown on Silicon via Pulsed Laser Deposition[1] CHRISTOPHER REIDY, JANET TATE, Oregon State University — Ultra-smooth, high quality ZnS films were grown on (100) and (111) oriented Si wafers via pulsed laser deposition with a KrF excimer laser in UHV (10^{-9} Torr). The resultant films were examined with optical spectroscopy, electron diffraction, and electron probe microanalysis. The films have an rms roughness of $\sim$1.5 nm, and the film stoichiometry is approximately Zn:S :: 1:0.87. Additionally, each film exhibits an optical interference pattern which is not a function of probing location on the sample, indicating excellent film thickness uniformity. Motivation for high-quality ZnS films comes from a proposed experiment to measure carrier amplification via impact ionization at the boundary between a wide-gap and a narrow-gap semiconductor. If excited charge carriers in a sufficiently wide-gap harvester can be extracted into a narrow-gap host material, impact ionization may occur. We seek near-perfect interfaces between ZnS, with a direct gap between 3.3 and 3.7 eV, and Si, with an indirect gap of 1.1 eV.

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