

Abstract Submitted
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Heteroepitaxial ZnS Films on Si for Photovoltaic Applications¹

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— Many novel photovoltaic devices have been designed recently that rely on heterojunctions to induce carrier multiplication. To that end, high quality ZnS thin films were grown on (111) and (100) oriented Si wafers via pulsed laser deposition. ZnS is a good candidate for such a device, since its band gap is wider than that of silicon, and the lattice constants of these materials differ by only 0.3% at 25C. The ZnS growth was found to depend strongly on orientation and surface reconstruction of the silicon substrates. Epitaxial ZnS formed on (111) silicon at a substrate temperature between 300C and 350C. With optimized growth conditions, the film stoichiometry was 1:1 Zn:S as measured by energy dispersive x-ray spectroscopy and electron probe microanalysis. The structure of the films was investigated by convergent beam electron diffraction, and high-resolution transmission electron microscopy shows that the films formed with abrupt junctions and limited diffusion across the interface.

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