Abstract Submitted
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Sb_xO_y thin films using pulsed lased deposition[1] JAMES HAGGERTY, BETHANY MATHEWS, JANET TATE, Oregon State University, VLADAN STEVONOVIC COLLABORATION[2], STAPHAN LANY COLLABORATION[3] — We demonstrate synthesis of Sb_2O_3 and Sb_2O_4 thin films on heated glass, and fused SiO_2 slides in an oxygen atmosphere using pulsed laser deposition and ex-situ annealing in air. GW calculations with spin-orbit corrections predict that the band gap of Sb_2O_3 changes from 3.4 eV in the orthorhombic β-phase to 4.7 eV in the cubic α-phase. Sb_2O_4 also forms two polymorphic structures, orthorhombic α-Sb_2O_4, and monoclinic β-Sb_2O_4. Optical absorption and crystal structure are investigated using transmission/reflection spectroscopy and grazing incidence x-ray diffraction. Optical absorption measurements of α-Sb_2O_4 show a band gap of 3.9 eV which is far from the DFT predicted band gap of 2.1 eV but agrees with previous measurements. Structural analysis shows that from an α-Sb_2O_4 target, α- Sb-$_2O_4$ thin films are formed at a temperature and pressure of 400 °C and 3 mTorr. Deposition at higher pressures (6 and 12 mTorr) produces amorphous films that, when annealed at 500 °C become a mixture of α-Sb_2O_4 and an additional cubic phase of Sb_2O_4.

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