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A Study of point defects and cause of nonstoichiometry in InSb nanowires GOPAL SAPKOTA, USHA PHILIPOSE, University of North Texas, Denton, TX — On account of its direct, narrow band gap (0.18 eV at 300 K) and very high electron mobility (7.8 $m^2V^{-1}S^{-1}$), Indium Antimonide (InSb) is a promising material for device applications. Synthesizing crystalline InSb as a low dimensional system would lead to the realization of nanoscale devices like IR photodetectors. However, its synthesis remains a challenge because its stoichiometry is found to be critically dependant on growth conditions. In this talk, we present a study of the influence of growth parameters such as temperature and vapor pressure of constituents on the morphology and stoichiometry of InSb nanowires. Transport measurements on nanowires show strong n-type conduction attributed to a large number of electrically active impurities – Sb vacancies. We present a simple thermodynamic model to qualitatively explain our experimental findings of the evidence of point defects in these nanowires. Indium and antimony vacancies and charged versions of these defects are determined as a function of temperature and partial pressure of antimony.

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