ACCGE-20 ABSTRACT

Growth of InSb and InI crystals on earth and in microgravity

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Abstract

During the past 40 years, dozens of semiconductor crystal growth experiments have been conducted in space laboratories. The subsequent analysis of the space-grown crystals revealed (i) that weak convection existed in virtually all melt-growth experiments, (ii) de-wetting significantly reduced the level of stress-induced defects, and (iii) particularly encouraging results were obtained in vapor-growth experiments. In 2002, following a decade of ground based research in growing doped Ge and GaSb crystals, a series of crystal growth experiments was performed at the ISS, within the SUBSA (Solidification Using a Baffle in Sealed Ampoules) investigation. Te- and Zn-doped InSb crystals were grown from the melt. The specially designed furnace provided a side-view of the melt and precise seeding measurement of the growth rate. At present, under sponsorship of CASIS (Center for the Advancement of Science in Space, www.iss-casis.org), we are conducting ground-based experiments with indium mono-iodide (InI) in preparation for the "SUBSA II" ISS investigation, planned for 2017. The experiments include:
i) Horizontal Bridgman (HB) growth and ii) Vapor Transport (VT) growth. Finite element modeling will also be conducted, to optimize the design of the flight ampoules, for vapor and melt growth.