

III-V TERNARY BULK CRYSTAL GROWTH TECHNOLOGY

Partha Dutta

Department of Electrical, Computer and Systems
Engineering
Center for Integrated Electronics
Rensselaer Polytechnic Institute, Troy, New York,
USA

Address: CII-6015, 110 8th Street

City: Troy, NY

Zip Code: 12180

Country: USA

Phone: 518-276-8277

Fax: 518-276-8761

EMAIL: duttap@rpi.edu

Abstract

Semiconductor substrates with variable band gaps and lattice constants are key enablers for advanced electronic, optoelectronic, and photovoltaic devices. In spite of four decades of research on ternary substrates, the development of devices based on ternary lattice matched substrates have not been successful due to poor substrate quality of mixed alloys and/or low yield of wafers with same alloy composition [1-5]. Some of the recent advances made in the area of large diameter (50 mm or higher), compositionally homogeneous, bulk ternary crystal growth of GaInSb, AlInSb, GaInAs and GaInP will be presented [6,7]. One of the key parameters that dictate the crystal quality is the growth rate. For device grade substrates, the crystal growth rate has been found to be dependent on the alloy composition. Figure 1 shows the growth rate of GaInSb alloy system as a function of composition. For crystals grown at rates above the maximum growth rate have been found to be of poor quality. Similar studies have been performed for other III-V alloy systems and will be presented in this paper.

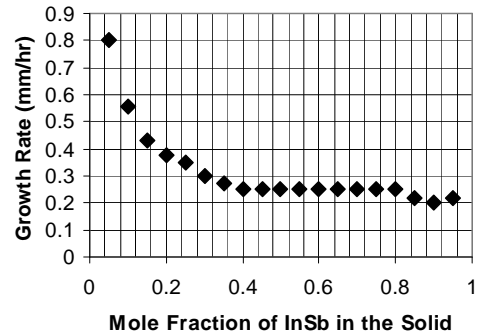


Figure 1. Maximum growth rate for vertical

Bridgman grown micro-crack free $\text{Ga}_{1-x}\text{In}_x\text{Sb}$ crystals as a function of alloy composition

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