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A STUDY ON THE SOLID-LIQUID INTERFACE SHAPE DURING THE GROWTH OF SI0.25GE0.75 IN MICRO-GRAVITY CONDITION UTILIZING BRIDGMAN METHOD

Abstract

Responding to the world ever demanding for flawless electronic devices such as life saving medical equipments, wireless communication sets, and digital audio and video players to name a few, which incorporate semiconductors, it is inevitable to expect defect free semiconductors to be used in them. These defects happen in the process of crystal growth at the solidification stage. Dissolution of silicon into the germanium melt is of the interest for this investigation in the microgravity environment, to suppress the convection in the solvent region and also to stabilize the silicon distribution near the solid-liquid interface. The investigation is carried out by employing a three-dimensional numerical modeling and simulation of single bulk crystals of Si0.25 Ge0.75 growth with (Si) rich. The curvature and shape of the silicon concentration in the process of crystallization near the growth interface is the main purpose of this study. Different temperature gradients were applied to observe the meridional as well as the azimuthal flow in the solvent region in earth gravity condition, near solid-liquid interface more specifically, and to determine the shape of solidification front. Results in earth gravity condition revealed that there is a strong convection in molten silicon germanium binary mixture. When heated in microgravity, it was observed that the process falls completely under the pure diffusion.