

Numerical Design and Characterization of SiC Single Crystals Obtained with PVT Method

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Abstract : In the present study, numerical simulations of heat and mass transfer in Physical Vapor Transport reactor during silicon carbide single crystal growth are addressed. Silicon carbide is a wide bandgap material with unique properties making it highly applicable for high power electronics applications. Because of high manufacturing costs improvements of SiC production process are required. In this study, numerical simulations were used as a tool of process optimization. Computer modeling allows for cost and time effective analysis of processes occurring during SiC single crystal growth and provides essential information needed for improvement of the process. Quantitative relationship between process conditions, such as temperature or pressure, and crystal growth rate and shape of crystallization front have been studied and verified using experimental data. Basing on modeling results, several process improvements were proposed and implemented.

Keywords : Finite Volume Method, semiconductors, Physical Vapor Transport, silicon carbide

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