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NUMERICAL SIMULATION OF HEAT TRANSFER IN DIRECTIONAL SOLIDIFICATION PROCESS FOR POLYCRYSTALLINE SILICON

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Abstract

Temperature distribution in the vacuum directional solidification system influenced seriously on the impurities concentration and microstructure in Polycrystalline Silicon. In this study, a numerical model for the transient global heat transfer for direction solidification process has been developed by the finite element method (FEM). A two-dimension numerical simulation for temperature distribution of directional solidification process was carried out using software Multi-physics Comsol 3.5a. The results showed that temperature distribution was dependent on withdrawing velocity and solidification fraction and the slope of the isothermal lines in the melt at withdrawing velocity 0.01mm/s was larger than that at withdrawing velocity 0.005mm/s under the same position of the crucible. The measuring points of temperature in the solidification system were compared with that of the calculation predictions.

Key words: directional solidification, numerical simulation, polycrystalline silicon, temperature distribution

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