

Effect of Heaters Fluctuations on the Temperature for High Quality Si Ingots

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To realize high quality multicrystalline silicon ingots for solar cells, the distribution of temperature during the unidirectional solidification process is one of the major important parameters. In the current work, we performed a simulation process for silicon growth using CGSim software to study the temperature distribution. The study considered three steps for the growth in A(0mm), B(100mm) and C(200mm) and using silica crucible of 200*135*135 (mm) (**Fig.1a**). The calculation conditions were based on a steady state and the crucible contains only molten silicon. The total number of calculations was 24, in which 8 simulations with variation temperature in each step (A, B, C) and the temperature was fixed for the top, middle and bottom heaters as a boundary condition. The results show a temperature difference along the crucible side, with around 70°C and 140°C (T1 and T2 in **Fig.1b**) in B and C respectively and the temperature profile have a little variation points P1 and P2 in the step C which is the important step for silicon crystallization (**Fig.1b**). The difference in same color temperatures in (**Fig.1b**) was related to the variation that we have set in the heaters with a 10°C change. The present results revealed a huge impact of the heaters fluctuation on the temperature distribution in the melt and this leads to the necessity to study this effect on the crystal/melt boundary.

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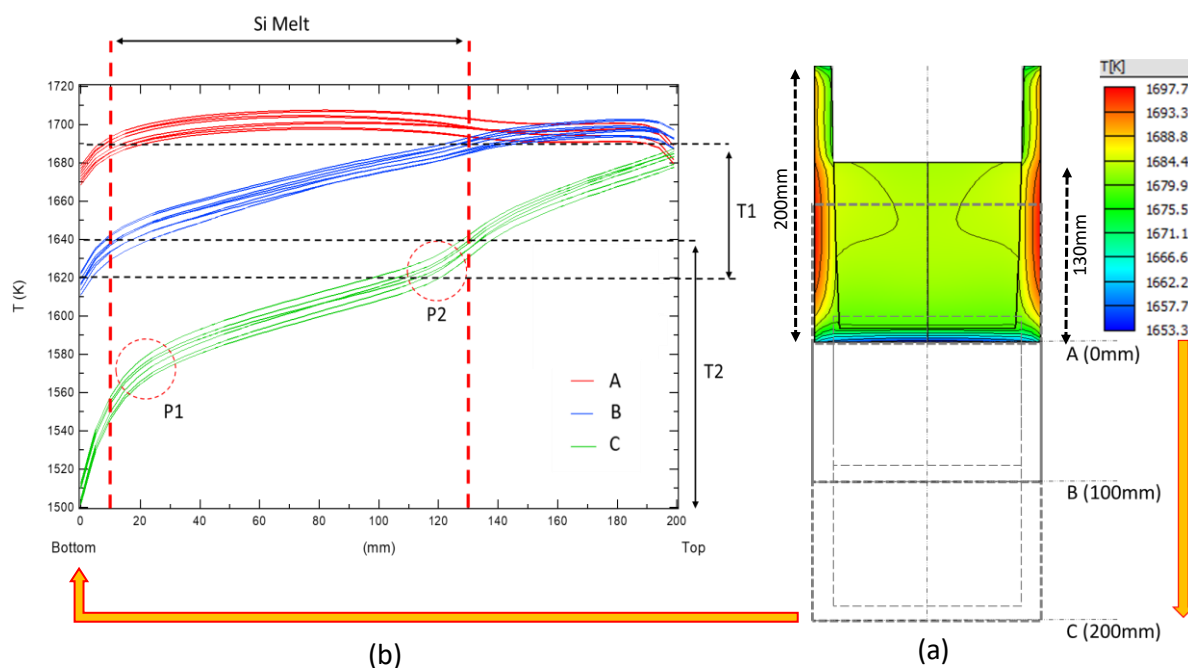


Fig. 1. The setup for the calculations process