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Effect of the fused quartz particle density on nucleation and grain control of high-performance multicrystalline silicon ingots

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Abstract

The nucleation process of high-performance multicrystalline silicon (HP mc-Si) growth seeded by fused quartz particles (FQP) through directional solidification is crucial for the ingot quality. To determine the optimal density of FQP and obtain a better nucleation process and the grain growth, we cast ingots using four different densities of FQP fixed on the bottom of the four quartz crucibles and covered them with a certain thickness of Si₃N₄ coating. FQP sizes of 30–50 mesh were used, and the influence of the fused quartz particle density on the nucleation mechanism, initial grain uniformity, grain size, density of dislocation clusters, and cell efficiency were analyzed. Compared with the ingots seeded with other three densities of FQP, the 220

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