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Abstract

The effects of rotation rate, filament size, mirror shape, and crystal diameter on the shape of the silicon molten zones prepared using the infrared convergent-heating floating zone method were examined. The crystal rotation rate did not significantly affect the shape of the feed-melt or crystal-melt interfaces, gap between the crystal and feed, zone length, or lamp power required to form the molten zone. More efficient heating was achieved using lamps with smaller filaments and ellipsoidal mirrors with higher eccentricity. The convexity of both the feed and the crystal sides of the molten zone decreased with increasing crystal diameter. However, the required lamp power, gap, and zone length increased with increasing crystal diameter. The stability of the molten zone seemed to reduce with increasing crystal diameter. The minimum melt width divided by the crystal diameter was found to be a good parameter to describe the stability of the molten zone.

Keywords:

A1. Heat transfer, A2. Floating zone technique, A2. Growth from melt, B1. Elemental solids, B2. Semiconducting silicon