

ACCGE-20 ABSTRACT

Shape evolution of detached Bridgman crystals grown in microgravity

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Abstract

Detached (or dewetted) Bridgman crystal growth defines that process in which a gap exists between a growing crystal and the crucible wall. In microgravity, the parameters that influence the existence of a stable gap are the growth angle of the solidifying crystal, the contact angle between the melt and the crucible wall, and the pressure difference across the meniscus. During actual crystal growth, the initial crystal radius will not have the precise value required for stable detached growth. Beginning with a crystal diameter that differs from stable conditions, numerical calculations are used to analyze the transient crystal growth process. Depending on the initial conditions and growth parameters, the crystal shape will either evolve towards attachment at the crucible wall, towards a stable gap width, or inwards towards eventual collapse of the meniscus. Dynamic growth stability is observed only when the sum of the growth and contact angles exceeds 180° .