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Investigation of influential parameters for zone-refinement of germanium crystals GANG YANG, JAYESH GOVANI, YUTONG GUAN, MIANLIANG HUANG, HAO MEI, GUOJIAN WANG, DONGMING MEI, University of South Dakota — In zone-refining of high-purity germanium crystals, the influential parameters include vacuum level, container of germanium ingot, ambient gases, zone travel speed, zone length, etc. In the present work, the influences of zone length and zone travel speed on the purity level of the zone-refined ingot have been investigated with many experiments. The impurity level in the zone-refined ingot was characterized by van der pauw hall measurement. The shallow impurities are measured with a photothermal ionization spectroscopy (PTIS), which identifies existence of boron, aluminum and phosphor as three main impurities, in the zone-refined germanium ingot. Utilizing the multiple experiments, we have optimized the zone length and zone travel speed. We demonstrate our experimental results with solidification theory of metals.

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