

The Dissipation Function of the First-Order Phase Transformation in Solids (I)

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Abstract

The motion equation with a term of interaction driving force of phase transformation is established and resolved for the process of the first-order phase transformation (FOPT). The expressions of internal friction Q^{-1} and modulus defect $\Delta M/M$ during the FOPT are obtained and a dissipation function of FOPT ΔG_R is acquired from the measurements of Q^{-1} and $\Delta M/M$ with various temperature change rate \dot{T} and frequency of Q^{-1} measurement ω . A dispersive relation of mobile interface coupling with low-frequency alternation stress is also obtained. The ΔG_R function characterizes not only the energy dissipation rate of the FOPT but also the mobility of the interface during the FOPT.

Keywords first-order phase transformation, dissipation function, dispersive relation, internal friction, interface mobility

· 简讯 ·

用低压气雾化法成功制取BiSn合金微粉

用惰性气体雾化法所得的粉粒具有均匀的圆球形状，粒度可达 $10\sim 20\mu\text{m}$ ，含氧量低。但是使用这种方法的喷气压力较高（ $4\sim 8\text{MPa}$ ），气体消耗量大，生产成本较高，使大规模工业生产受到限制。本方法使用低喷气压力（ $0.3\sim 0.5\text{MPa}$ ），通过改善喷嘴设计等方面的参数可达到最佳粒度分布为 $10\sim 20\mu\text{m}$ 的BiSn共晶合金粉末。

喷嘴设计采用了改进的环孔结构，在低熔点合金雾化时，制作简单，在气流剪切金属液体时还可使金属液流和雾化气流同时喷射因而雾化效果较好。此外，采用改进雾化仓，即恰当选取圆柱筒体的直径和高度比例以及雾化仓下部的圆锥倒角，进一步改善了雾化效果。

（材料科学研究所：伍尚华、曾文光）

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