

A Study on Kinetics Parameters of Titanium Hydride Powder from its TPD Spectrum for Metal Foam

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Abstract

Titanium hydride powder is often used as blowing agent to fabricate the Al alloy foam. Titanium hydride powder decomposition behaviour is different with air condition in molten Al. Theory of temperature programmed decomposition (TPD) and related experimental technique is studied. The TPD theory consists of Consulting Table Method (CTM), Spectrum Superposition Method (SSM) and Isodecomposition Rate Method (IDRM). The thermal decomposition kinetics parameters of titanium hydride powder, which furnish the scientific basis for controlling the Al alloy melt foaming process, has been acquired by using the TPD theory and the related technique. When a substance is investigated by temperature programmed decomposition (TPD) in an inert gas flow and a TPD spectrum is obtained. The Al alloy melt foaming process happens in a crucible that has a constant cross-sectional area in vertical direction. The upside of a foaming melt can be regarded approximately as a plane, so during the holding foaming period, the relationship between the porosity of Al alloy melt foam, P_r , and the holding time, t_h , during the holding foaming period can be measured by the real-time method. The thermal decomposition kinetics parameters and corresponding equations can be acquired by using this new theory in combination with the related experimental apparatus. The Al alloy melt foaming process can be predicted by the kinetics equations of titanium hydride powder.