

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Experiments from Sub-orbital to Orbital Platforms (3)

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THE RAPID SOLIDIFICATION OF ALUMINUM 40 WEIGHT PERCENT NICKEL USING A DROP
TUBE APPARATUS

Abstract

An understanding of the formation of selected phases is an essential aspect in the choice of an alloy and the production method. Research has pursued the rapid solidification of an Aluminum 40 wt% Nickel alloy. Al-Ni alloys serve to generate components applicable to high temperatures due to their relatively high melting temperatures and strength properties. An Impulse Atomization process developed at AMPL was used to produce a variety of sized particles with varying cooling conditions. Particles were sieved and sized. The powder produced ranged from 1000 microns down to less than 180 microns in diameter. A Labsys EVO TG-DSC 1600 allowed thermal analysis of particles and has been used to correlate relationships of phase fraction in a range of particle sizes to the cooling condition in which they were formed. Along with DSC results, neutron diffraction techniques were also used to analyze the aluminum nickel powders. The experimental results were compared with other drop tube and parabolic flight experiments of same composition.