Experimental analysis of heterogeneous nucleation in undercooled melts by infrared thermography

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Abstract

A new experimental technique for quantitative analysis of heterogeneous nucleation in undercooled melts is proposed in this paper. It is based on the observation by infrared thermography of the thermal behavior on cooling of a large population of small droplets deposited on a substrate. The method allows analyzing the influence of different parameters such as the size of the droplets, the cooling rate and the wettability of the substrate on the nucleation rate. The fundamentals of the method, the associated experimental set-up, and the mathematics required for data processing are described in the paper. The results of the nucleation analyses carried out using erythritol deposited on different substrates are also presented and discussed.

Key words: Heterogeneous nucleation, infrared thermography, Singular Value Decomposition.

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