

Visualization of a Thermal Diffusion Field around a Single Ice Crystal Growing in Supercooled Water under a Short-term Microgravity Condition

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Abstract

A thermal diffusion field around a growing ice dendrite was observed under 4.5 s microgravity (μg) conditions using a drop shaft at Microgravity Laboratory of Japan (MGLAB). A single ice crystal was grown in 99.9% D₂O water. The thermal diffusion field was observed as the bend of interference fringes. The interference fringes were analyzed by the Windowed Fourier Transform (WFT) method, a newly developed method for analysis. It was clearly shown that the thermal diffusion field continuously develops around the ice crystal growing in the supercooled water. This result provides direct evidence that the latent heat released at the growing interface diffuses in the environment around the crystal.