Thermophysical Properties of 10, 20 mol% Ga-Fe Melts Measured by Electromagnetic Levitation

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Fe-Ga alloys are expected to be used as materials for vibration energy harvesting devices because they exhibit particularly large magnetostriction among magnetostrictive alloys. To date, Fukuda Crystal Laboratory and Tohoku University have developed a technique for growing single crystals of Fe-Ga alloys by the Czochralski method, and have also shown that the grown single crystals satisfy the properties required as materials for vibration energy harvesting devices [1]. Recently, it has been shown that the undercooling phenomenon in the melt is related to homogeneous single-crystal growth in this technology [2], but the crystal growth mechanism has not been clarified. Therefore, the authors measured the thermophysical properties of Fe-Ga melts over a wide temperature range, including the undercooling temperature range, using electromagnetic levitation method to obtain data that will contribute to the clarification of the growth mechanism of Fe-Ga single crystals. We present here the results of density, surface tension, normal spectral emissivity, specific heat, and thermal conductivity measurements of 10 mol%Ga-Fe and 20 mol%Ga-Fe using the electromagnetic levitation method [3,4].

References

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