

## Heat capacity measurement for liquid cobalt using noncontact laser modulation

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Currently, nickel-based super alloys have been used for jet engine turbine blades for aircraft and intensively studied for use in high temperature environment. A numerical simulation is important to improve the casting process for nickel-based alloys, and accurate thermophysical properties such as heat capacity of the alloys in the liquid phase are necessary as input parameters for the simulation. It is difficult to measure thermophysical properties of liquid metals because of their high chemical reactivity. To solve this problem, we have been developing noncontact laser modulation calorimetry for liquid metals. The noncontact laser modulation calorimetry is conducted using a combination of an electromagnetic levitator (EML) and a dc magnetic field. A dc magnetic field suppresses surface oscillation and translational motion of the sample and convections in the sample, which enable accurate measurements of heat capacity and thermal conductivity. We previously reported the heat capacity and thermal conductivity of liquid nickel. In this study, the heat capacity of liquid cobalt, a main constituent of nickel-based super alloys, is measured using noncontact laser modulation calorimetry. The laser absorptivity of liquid cobalt is required to obtain heat capacity for the calorimetry, which is also measured using EML under a dc magnetic field in this study. A cobalt sample (purity: 99.98 or 99.9995 mass%, mass: about 1.0 g) was electromagnetically levitated using radio frequency (RF) coil system and melted by Joule heating in a dc magnetic field. Then, the sample was heated periodically by laser irradiation, and the temperature response of a sample was measured using a pyrometer. The isobaric molar heat capacity of liquid cobalt does not present temperature dependence. Details of experimental, results and discussion will be given in the symposium.