

Measurements of Density and Structure of Alloys Liquids by Levitation Technique

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We have measured accurately the densities of high-temperature alloy's liquids by electromagnetic levitation (EML) technique within the static magnetic fields. In the technique, the Lorentz force by the interaction between the liquid metals and the static magnetic fields reduces the surface oscillation and translational motion of samples. By the effect, we can precisely obtain the correct volume of levitated liquid samples like a solid body with reducing an order of magnitude compared with previously reported data using levitation technique. Using the technique, we obtained the density of high-temperature liquid of various alloys in the temperature range from 700 to 2400 K. We also performed the structural analysis of these liquids using high-energy x-ray diffraction by the synchrotron source of SPring-8 in Japan combined with the levitation technique. Diffraction data were analyzed by the reverse Monte Carlo (RMC) technique and the Voronoi polynomial analysis. From the accurate density data and structural analysis results, we discuss the density change with temperature and compositions from the viewpoints of liquid structure with atomic interactions in the liquid phases.