Density Measurement of a Co-Cr-Mo Melt with an Electromagnetic Levitation Technique in a Static Magnetic Field

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Co-Cr-Mo alloy is widely used as an orthopedic and dental implant material because it has excellent corrosion resistance, wear resistance, and good biocompatibility. Recently, the alloy was fabricated by additive manufacturing with electron beam melting [1, 2]. Simulation of the melting and solidification process of this alloy needs thermophysical properties in the liquid state. The purpose of this study is to measure the density of the Co-Cr-Mo alloy (ASTM F75) in the liquid state. The liquidus temperature of the alloy was obtained by differential scanning calorimetry. The density of the Co-Cr-Mo melt was measured over a wide temperature range from the supercooled region to 100 K above the liquidus temperature with an electromagnetic levitation technique in a static magnetic field [3]. A radiation thermometer was calibrated by the liquidus temperature. The density of Co-Cr-Mo melt monotonically decreased with increasing temperature, and mass loss of the sample during the measurement was within 0.5 - 1 mass % owing to evaporation.

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References: