

Experimental Study of the Electrical Conductivity and Thermal Conductivity Property of Micro-based Al-Cu-Nb-Mo Alloy

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Abstract : Aluminum based alloys with a certain compositional blend and manufacturing method have been reported to have excellent electrical conductors. In the current investigation, metal powders of Aluminum (Al), Copper (Cu), Niobium (Nb), and Molybdenum (Mo) were weighed in accordance with certain ratios and spread equally by combining the powder particles. The metal particles were mixed using a tube mixer for 12 hours. Before pouring into a 30mm-diameter graphite mold, pre-pressed, and placed into an SPS furnace, the thermal conductivity of the mixed metal powders was evaluated using a portable Thermtest device. Axial pressure of 50 MPa was used at a heating rate of 50 °C/min, and a multi-stage heating procedure with a holding period of 10 min. was used to sinter at temperatures between 300 °C and 480 °C. After being cooled to room temperature, the specimens were unmolded to produce the aluminum, copper, niobium, and molybdenum alloy material. The HPS 2662 Precision Four-point Probe Meter was used to determine the electrical resistivity and the values used to calculate the electrical conductivity of the sintered alloy samples. Finally, the alloy with the highest electrical conductivity and thermal conductivity qualities was the one with the following composition: Al 93.5Cu4Nb1.5Mo1. It also had a density of 3.23 g/cm³. It could be advisable for usage in automobile radiator and electric transmission line components.

Keywords : Al-Cu-Nb-Mo, electrical conductivity, alloy, sintering, thermal conductivity

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