

## CHARACTERIZATION OF HOT PRESSED COPPER-IRON COMPOSITES

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**Keywords:** Cu-Fe composites, Hot press, Microstructure, Electrical conductivity

### ABSTRACT

The Copper is a well know material for use as heat exchanger or electrical conductor. However, copper has a considerable low tensile strength and temperature limit. A material that has a good thermal and electrical conductivity, low cost, but also resistance is the desired. Effects of copper on the sintering and thermal properties of Cu-Fe composites produced by powder metallurgy and Fe on Cu-Fe composites have been investigated. Copper and iron were varied from 10 to 90 atomic% in the samples, alternating the continuous phase. Hot pressing studies were performed by in-situ dilatometry aiming to define the proper conditions for sintering, without swelling normally associated with copper. Results indicate that the conditions of hot pressing, final microstructure, specially the phases relation and distribution and not only the amount of copper, have a great effect into the thermal properties. By controlling the sintering parameters, it is possible to obtain dimensionally stable samples with higher electrical conductivity and lower copper amount. The effects of alloy composition on the microstructure Cu-Fe composites were systematically examined using FE-SEM, EDS, and XRD. The grain size of the Cu-Fe composites was increased as the amount of Fe increased. The ultimate strength was enhanced with the decrease of Cu amounts, but the conductivity and elongation was decreased.