

Comparison of liquid phase sintering and Cu-melt infiltration methods to consolidate 80W-Cu composite using nickel as sintering activator

Abstract

In this article, studies were conducted to evaluate the densification of W- Cu sintered compacts produced using two methods; liquid phase sintering (LPS) and combination of liquid phase sintering and liquid infiltration technique (LPS+LI) named Cu-melt infiltration (Cu-MI). Low concentration of nickel (1wt.%) was used to activate the sintering process in both methods. Isothermal sintering was carried out in alumina tube furnace at temperatures of 1150°C for 2 hr. under H₂/Ar. as protective gas. The infiltration(Cu-MI) method proved to be effective in the densification, microstructure and hardness enhancement of the80W-Cu compact as opposed to the other conventionally liquid phase sintered compacts. The relative densities of 80W- Cu- 1Ni composites prepared by using insert method (Cu-melt infiltration) achieved 96.22% of theoretical density.

Keywords

Infiltration technique; Liquid phase sintering; Metal matrix composites; W-Cu composites