

Thermophysical Properties of Tungsten-Copper Alloys

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As the speed and integration of semiconductor devices increases, the generation of heat increases, resulting in effective heat dissipation influences on the performance and lifetime of semiconductor devices. Tungsten-copper alloys have high electrical and thermal conductivities, low contact resistances, and low coefficients of thermal expansion. So, these materials are used as shielding materials in micro-wave packages and heat sinks in high power IC. In this study, the thermal conductivity and thermal expansion of several kinds of W-Cu alloys, composed of 10 ~ 30 % copper balanced with tungsten, were investigated. The powders of tungsten-copper were developed by the spray conversion method, and the W-Cu alloys were fabricated by metal injection molding. The thermophysical and microstructure properties were investigated. The results show that the thermal conductivity and thermal expansion were improved by a nanocomposite powder. The results for W-Cu alloys are discussed in detail in comparison to the data available in literature.