SMI **PRODUCT BULLETIN**

PB-500: Low Expansion Materials for Thermal Mgmt in Opto Packaging

Low-Expansion Materials for Thermal Management in Optoelectronic Packaging

Target Applications: MEMS and MOEMS

Custom Solutions

SMI is a manufacturer of controlled expansion materials. We offer controlled low expansion tungsten-based materials ranging from 80 to 95 percent tungsten content. The addition of materials such as nickel and copper promote tungsten solubility and wetting during the manufacturing process and contribute to the low thermal expansion achieved. The result is a pore free, machinable material with unique properties.

Typical Material Properties

Material Composition (weight %)	**W/Cu** 90/10	**W/Ni/Cu** 95/3.5/1.5
Thermal Expansion ($x10^{-6}$/K)	6.4	5.2
Thermal Conductivity (W/m•K) 25°C	201	74
Density (g/cc)	17.2	18.2

These metals are useful for applications where the thermal expansion of the package or substrate needs to closely match silicon, III-V semiconductor materials, and/or certain optical glasses (e.g., Corning 7059). For MEMS or MOEMS substrate applications, excellent match of thermal expansion reduces thermal stress. This can increase reliability, improve signal-to-noise ratio, simplify signal processing, and reduce component count by eliminating the need for thermal compensation.

The tungsten-based materials have vastly better thermal conductivity than Kovar, which results in more uniform device temperatures in power-dissipating applications. SMI provides precision-machined components manufactured and plated to our customer's specifications. We will tailor the composition to meet the thermal expansion matching requirements. All of these materials can be plated to facilitate high temperature soldering and brazing and to allow the assembly to meet Telcordia environmental requirements.

For additional information, applications, or pricing, please contact:

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