Electronic Packaging Materials Molybdenum-Copper

Custom Solutions

Many microelectronic applications require tailored thermal expansion and high thermal conductivity sub-mounts, bases, or packages. SMI, with over 30 years experience in composite materials manufacturing, provides innovative solutions to your critical packaging requirements.

SMI uses the same proprietary infiltration process as our tungsten-copper material, but substitutes high purity, fine grain (~ 12 μ APS) molybdenum in place of tungsten. Molybdenum-copper offers a forty-percent density savings over tungsten-copper (W/Cu) for weight sensitive applications with only a minimum sacrifice in CTE. You receive similar benefits that our precision process provides without the extra weight of high density tungsten.

Typical Material Properties

Composition* (weight %)	**Density** (g/cc)	**CTE** ($x10^{-6}$/K) 25°C - 400°C	**TC** (W/m•K) 25°C
85Mo/15Cu	10.0	6.9	154
80Mo/20Cu	9.9	7.5	164
75Mo/25Cu	9.8	8.0	174

Custom compositions are available.

Our process produces a molybdenum-copper (Mo/Cu) composite with excellent mechanical stability that is better than 98 percent dense, guaranteeing hermeticity, homogenous thermal properties, superior platability, dimensional stability under thermal cycling, and high thermal conductivity.

SMI offers the design engineer the flexibility to custom tailor thermal expansion and still provide the highest available thermal conductivity with that CTE. In addition, Mo/Cu has the added advantage of lower density than W/Cu to meet your high performance weight sensitive applications.

We have an on-going development program to improve the properties of Mo/Cu. Please contact us for details.

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Spectra-Mat, Inc. 100 Westgate Drive | Watsonville, CA 95076 | tel 831-722-4116 | fax 831-722-4172 | www.spectramat.com

MOLYBDENUM-COPPER

SMI composite Mo/Cu offers the following advantages to our customers:

- Tailored thermal expansion to meet your specific design criteria
- Highest thermal/electrical conductivity performance available for this material
- Outstanding thermal-mechanical stability
- Critical dimensional tolerance and surface finish control
- Metallization capability including electrolytic, electroless, and thin film processes to meet your specifications
- Finer particle size available for critical edge and thermal uniformity specification
- A forty percent weight savings compared to W/Cu
- Short lead times

SMI Mo/Cu components are used in the following applications:

- Airborne/Satellite radar and other RF communication systems
- Telecommunication: RF and optical

Uses for Mo/Cu components:

- Microelectronic hermetic packages, housings and bases
- Heat spreaders and sub-mounts for RF and diode laser (GaAs) circuits
- Carriers for high reliability ceramic substrates
- Critical glass-to-metal interfaces

SMI process capabilities (for amenable designs):

- Thickness capability: .004" to >1.0"
- Dimensional tolerance: +/- 0.0002"
- Flatness: 2.5 micron/cm
- Surface Finish: <0.03 micron Ra (mirror); 0.4 - 0.5 micron Ra (matte)
- Edge quality: < 5 micron