SMI PRODUCT BULLETIN

Thin-Flat Submounts for Semiconductor Thermal Management

Target Applications: High Power Laser Diodes and RF Circuits

Spectra-Mat has developed a high temperature sinter and infiltrate process for the manufacture of controlled expansion composite (CEC) materials. Our sinter and infiltrate process allows SMI to offer thin tungsten/copper submounts to achieve extremely flat surface conditions. We use only high purity raw materials. There are no lubricants or sintering aides added during processing and iron content is held to less than 100 ppm. The result is a submount with excellent dimensional stability and thermal uniformity.

Spectra-Mat's Unique Process Offers the Following Advantages:

- Exceptional flatness and dimensional tolerance control
- Superior thermal conductivity compared to competitive products
- Excellent dimensional stability unaffected by high temperature cycling
- Ability to vary metal matrix density to achieve optimum combination of thermal conductivity and thermal expansion
- Metallization capability includes electrolytic, electroless, and thin film processes to meet your specifications

These characteristics make SMI's CEC material ideally suited where there is intimate contact between the semiconductor and a submount. CEC material can also increase reliability, improve signal-to-noise ratio, simplify signal processing, and reduce component count by eliminating the need for thermal compensation.

Typical Material Properties

Compositions* (weight %)	**90W/10Cu**	**85W/15Cu**	**80W/20Cu**
Thermal Expansion ($x10^{-6}$/K) 25°C - 400°C	6.4	7.0	7.6
Thermal Conductivity (W/m•K) @ 25°C	201	210	219
Density (g/cm^3)	17.2	16.6	16.2
Material Purity (%)	99.9	99.9	99.9
Tensile Strength (MPa)	550	470	470

Manufacturing Capabilities†

Polished Surface Finish	
Mirror	< 0.03 micron Ra
Matte	0.4 - 0.5 micron Ra
Dimensional	
Surface Flatness	2.5 micron / cm
Thickness	0.010 - 1.4 cm (0.020 cm typ.)
Max Dimension	25 cm
Edge Radius	< 5 micron
Metallization	
Electroplated	Ni, Ni/Au, Ni/Cu, others
Physical Vapor Deposition	All of the above, Ni/Pt/AuSn

†Best case for amenable designs

A molybdenum-copper CEC can be substituted for tungsten/copper and also meet these rigorous manufacturing specifications.

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

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