

Low Expansion Components for Thermal Management in Photonics

Target Applications: Optical Platforms and Optoelectronic Packages

Spectra-Mat has developed a high temperature sinter and infiltrate process for the manufacture of low expansion composite (LEC) materials. Our sinter and infiltrate process allows SMI to offer thick (up to 25mm-hermetic) and thin (down to 125um) components with the ability to achieve extremely flat surface conditions. We use only high purity raw materials. There are no lubricants or sintering aides added during processing. The result is a LEC component with excellent dimensional stability (CTE), thermal uniformity (TC), and flatness applicable to optoelectronic applications.

Tungsten and Molybdenum Based Material – Typical Properties

Material Composition (Wt %)	WC25 75/25 W/Cu	WC20 80/20 W/Cu	MC15 85/15 Mo/Cu	WC15 85/15 W/Cu	WC10 90/10 W/Cu	WHA95 95/3.5/1.5 W/Ni/Cu
CTE ($\times 10^{-6}/K$) 25°C - 400°C	8.0	7.4	6.9	6.8	6.2	5.2
TC ($W/m \cdot K$) 25°C	228	219	154	210	201	75
Density (gm/cm^3)	15.7	16.2	10.0	16.6	17.2	18.2

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

- Ability to vary metal matrix density to achieve optimum combination of CTE and TC values
- Excellent dimensional stability unaffected by high temperature cycling
- Machinable to exceptional flatness, edge radius and surface finish
- Superior thermal conductivity compared to competitive products
- Metallization capability includes electrolytic and electroless plating and thin film deposition

These characteristics make Spectra-Mat's LEC composites ideally suited for high power devices, silicon and III-V semiconductor materials, optical benches and optoelectronic packages.

Manufacturing Capabilities†

Polished Surface Finish	Mirror	< 0.03 micron Ra
	Matte	0.4 - 0.5 micron Ra
Dimensional	Surface Flatness	10 micron / 10mm
	Thickness	125 micron to 25mm
	Max Dimension	250mm
	Edge Radius	< 15 micron
Metallization	Electroplated	Ni, Ni/Au, Ni/Cu, Cu, Ni/Ag
	Physical Vapor Deposition	Au, Ni, Pt, Ti, AuSn

†Best case for amenable designs

Typical properties are believed to be accurate and reliable, but are presented without guarantee or warranty.

For additional information, applications or pricing, please contact:

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