The last mile of IC design and packaging technology-thermal solution

In the past, most packaged heat sinks have been made out of copper or aluminum due to its good thermal conductivity and low cost. However, its material expansion coefficient (CTE) is too high. After the chip has operated for a vast period of time, the molding compounds may peel off and cause the chip to overheat. If the signal transmission is unclear or delayed, the chip operation speed becomes slowed, or even burned out.

With the advancement of wafer manufacturing technology, die sizes have become significantly smaller, as well as the packaging technology being upgraded from a single chip packaging to a multi-chip packaging. If the heat source becomes more concentrated, the copper or aluminum heat sinks with high expansion coefficients can no longer meet the needs of package heat dissipation.

Although silicon carbide can meet the needs of low expansion coefficient (CTE), the forming process is difficult, and the cost is much more expensive than copper and aluminum, so it is not an ideal package heat dissipation material.

Tungsten copper alloy (W-Cu) is a material with a low expansion coefficient, and a high thermal conductivity. The firming process is simple and the cost is very competitive. It is definitely the most potential heat dissipation packaging material of the next generation. After years of hard work, Malico Inc.' s R&D team has successfully developed Tungsten Copper (W-Cu) heat dissipation materials with a high thermal conductivity and a low coefficient of expansion. This is could most certainly be considered a breakthrough in the field of heat dissipation.
comparison :

	thermal conductivity	coefficient of expansion	forming	cost
copper	390~420 W/mk	16.6 x 10^{-6}/K	good	competitive
aluminum	200~220 W/mk	25.0 x 10^{-6}/K	good	competitive
silicon carbide	340 W/mk	4.0 x 10^{-6}/K	difficult	expensive
tungsten copper	180~200 W/mk	8.2 x 10^{-6}/K	good	competitive