



TECHNOLOGY

Transient Liquid Phase Sintering Paste

OVERVIEW

Background

Electronic systems are increasingly used in harsh environments under elevated thermal conditions. This includes applications with high absolute temperatures as well as those with very large temperature swings. Some examples of these types of applications include deep well drilling, military and aerospace, or automotive products. Yet the packaging and interconnect technologies applied in these microelectronic systems were developed for conventional Si-based devices with their limited application temperatures. This limits their temperature range for reliable operation to temperatures below 200 C. The established technologies suffer significant drawbacks for reliable high temperature operation and alternatives are required.

Innovative technology

Researchers at the University of Maryland have developed Transient Liquid Phase Sintering (TLPS) sinter pastes that enable the formation of joints with a microstructure that is characterized by pure metallic particles embedded in a matrix of intermetallics. They can be processed at low temperatures but possess high melting temperatures upon process completion. No application of vacuum or reducing atmosphere is required during processing. Depending on paste composition, the joints can possess high melting temperatures of above 600 C and they show superior drop test reliability compared to those formed with traditional Sn3.5Ag solders. The joints show the potential for reliable operation in environments with extreme thermal or mechanical loads.

APPLICATIONS

- Power electronics placed in high temperature environment
- SiC and GaN operating at higher temperatures than Si devices
- Efficient Si devices with increasing power densities
- Space probes
- Geothermal
- Oil and gas wells

ADVANTAGES

- Low temperature processing
- High temperature resistance upon solder joint completion
- Superior joint strength

- Low cost materials

CONTACT INFO

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

CATEGORIES

- Power Electronics
- Microelectronics
- Industrial Processing
- Nanotechnology + Nanoparticles + Nanomaterials
- Materials

EXTERNAL RESOURCES

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