

Reference No.: 79
Project Title: Processes for Utilizing Laser Machined Metallized Polyimide for Electronic Circuit Applications
NEPP Project: Electronics Packaging Project
Point of Contact: Harry Shaw, GSFC, 301-286-6916
Proposing Center: GSFC
Participating Center(s):
Status: X New: On going:
Performance Periods: FY 00 – FY02
Benefits:

Metallized polyimide is growing in popularity for electronic circuit applications because its form factor is very flexible, it is lightweight and very affordable. As a result, this material is being exploited for more and more complex applications. It is being considered for use as a substrate structure and integral member for constructions that use vapor deposited coatings and laser processed through-holes. Its role in known good die applications is increasing as well.

Research of processes being used with metallized polyimide will advance projects' ability to make use of this highly available, commercially driven technology. Opportunities for demonstrating affordable methods for processing small quantities and for mass production exist. The presence of this technology in the commercial sector for portable electronics heralds its eventual use in spacecraft because commercial industry drives affordable technologies and miniaturized systems parallel form factors required by the aeronautics and avionics industries. This technology applied to electronics assemblies usable by all of the NASA enterprises.

Partnerships and Endorsements
Objectives of Proposal Activity:

This task will investigate the processes being pursued by NASA and industry to extend the applicability of the technology; specifically the use of Co2 (pulsed IR) and Excimer (pulsed UV) lasers to modify copper and polyimide geometries and the use of advanced materials and die attach techniques to obtain miniaturized systems on these substrates. Yield, reliability and cost issues will be explored. This will be achieved through the construction of test vehicles and testing using environments of particular interest to avionics and flight hardware applications. Chip and wire, flip chip and ball grid array interconnections will be explored.

Technical Approach:

- Evaluate materials for stud bumping, such as gold, indium and solder.
- Evaluate electrically anisotropic conductive adhesive (ACA). ACA is used to bond between the silicon chip and the metallized polyimide by applying a heat and pressure cure.
- Evaluate aligning the metallized polyimide to make the interconnection.
- Evaluate interconnect reliability. The assembly will be subjected to environmental testing such as temperature cycling, vibration test, and acceleration. The assembly will be subjected to conventional analyses such as X-ray, peel strength measurement test, and Destructive Physical Analysis (DPA).

Deliverable and Milestones:

Schedule:

- Description of configurations & processes 3QTR00
- Test Plan 3QTR00
- Test Vehicles 4QTR00
- Test Report 2QTR01
- New Test Vehicles 4QTR01
- Test Report 1QTR02