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Brief 70-10445

NASA TECH BRIEF

Aluminum–Silicon Eutectic Alloy Improves Electrical and Mechanical Contact to Silicon Carbide

The problem:

To provide a reliable method for making electrical and mechanical contact to silicon carbide surfaces. The previous gold–tantalum alloys only make satisfactory contact at relatively high (1200° to 1400°C) temperatures, are not reproducible, can separate due to a carbon layer at the interface, and are often blocking on p-type silicon carbide.

The solution:

A shallow aluminum–silicon eutectic alloy contact layer, made at relatively low temperature, with good wetting characteristics to give electrical and mechanical reliability.

How it's done:

The contact alloy contains approximately 11.3 atomic % silicon and 88.7 atomic % aluminum, and melts at 577°C. The alloy does not wet silicon carbide immediately upon melting, but must be raised to about 900°C before it flows out to form the contact. This wetting action proceeds slowly and affords excellent control of the wetted area. Contacts adhere well to the silicon carbide surface (see Note 1) and penetrate about 300 to 500Å into the silicon carbide surface.

Notes:

1. In 20 test contacts subjected to normal operation, none have come off. Additionally, efforts to mechanically push or pull them off with reasonable pressure have failed.
2. These contacts are ohmic on p-type silicon carbide and are blocking on n-type.
3. No additional documentation is available. Specific questions, however, may be directed to:

   Technology Utilization Officer
   Headquarters
   National Aeronautics
   and Space Administration
   Washington, D.C. 20546
   Reference: B70-10445

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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Category 03