

KUPRION INC.

NANOCOPPER SOLDER ADHESIVE – NSA-16

NO-CLEAN, LEAD-FREE, SOLDER-FREE

Technical Data Sheet

PRODUCT DESCRIPTION

NSA-16 is an all-nanocopper based, lead-free, nitrogen “reflowable” no-clean pure metal adhesive specifically designed for high thermal and electrical demands. The surfactant / activator system completely evaporates during reflow, leaving no residue lacking any post-process outgassing. NSA-16 is stencil printing capable with a 7-month shelf life (r.t. storage).



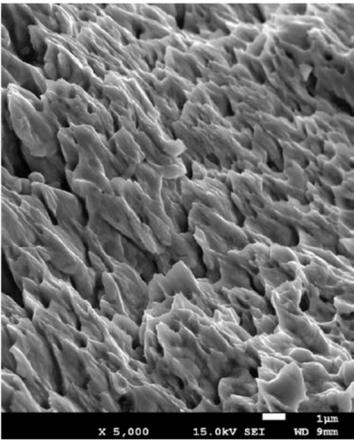
Typical nanocopper paste packaging in ready to dispense pneumatic syringes compatible with all standard dispensing equipment; different sizes available.

SPECIAL FEATURES

Contrary to normal solder, Kuprion’s nanoparticle based NSA-16 material does not melt during reflow. Its fusion and bonding mechanism is based on solid-state-sintering at the nanoscale. Because it does not liquefy during heating, it does not wick adjacent contacts enabling unprecedented narrow contact pitch and component placement such as desired for BGAs, QFPs, LEDs etc. It exhibits robust printing characteristics having shown drop-in replacement for solder and can achieve consistent paste volumes below 0.1 mg. The novel activator mixture in NSA-16 was designed to be less aggressive than in typical solder formulations – ideal for sensitive applications, but still provides superior wetting and bonding to OSP coated and Immersion Silver pad finishes as well as good bonding to ENIG, ENEPIG and tin-based finishes. While the material fuses at temperatures as low as 200°C, it has the potential to operate at much higher temperatures since upon fusion, it reverts to bulk copper with a melting point of 1084°C.

What you put down is exactly what you get!

- RoHS Compliant:
 - Product meets the requirements of the restriction of hazardous substances (RoHS) directive, 2015/863.
- Excellent anti-slumping, minimizing wicking / bridging:
 - Enables very narrow contact pitch / component placement
- Excellent solderability including Palladium
- After “reflow”, devoid of any residues – completely no-clean
- Air-stable - can be handled safely in air for stencil processing, pick & place and other dispensing techniques.
- Only requires nitrogen atmosphere during fusion to avoid oxidation:
 - Good results are obtained with an oxygen content below 200 ppm.
- Storage at r.t. (60-80°F) is recommended to ensure shelf life of up to 7 months from date of manufacture when handled properly.
- Reflow peak temperature can be as low as 200°C depending on equipment used, board characteristics and pad finish.
- Fused joints exhibit high electrical and thermal conductivity of up to 5-7 times that of standard solder materials when properly processed.
- Combines low temperature processing with the potential for operating at much higher temperatures.



SEM of fracture surface showing extensive shear deformation and cohesive ductile failure.

NSA-16 PASTE & FUSED PROPERTIES

Composition	>90% w/w nanocopper
Particle size	<100 nm
Paste Density	3.5 - 5 g/ccm
Joint Shear Strength	can exceed 100 MPa
CTE	tbd
Thermal Conductivity	up to 300 W/m*K
Electrical Conductivity	Up to 70% of bulk Cu
Fused Porosity	5-20% v/v



Fused nanocopper, 300 micron size dots

NSA-16 APPLICATION SPACE

Die-Attach: Component thermal requirements and high temperature applications often require a high-temperature capable die-attach material. With a melting point of ultimately 1084 C as bulk copper after fusion, NSA-16 has the potential to satisfy such demands.

High-Reliability Applications: NSA-16's compatibility with various gold metallization systems, combined with its robustness, makes it an excellent choice for extreme environments such as automotive, oil & gas exploration, medical, defense and aerospace.

Hermetic Sealing: NSA-16's excellent wetting properties, its low processing temperature capability, and its long-term reliability makes this material highly desirable for sealing applications in cell phones and other packaging applications.

Brazing Alternative: Copper with a tensile strength that can exceed 100 MPa (> 14 500 psi) can provide a great alternative to brazing when high strength must be achieved at relative low soldering temperatures.

Contact Us

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HEALTH AND SAFETY

This product, during handling or use, may be hazardous to your health or the environment. Read the Safety Data Sheet and warning label before using this product.

The SDS for this product can be found online at <http://www.kuprioninc.com>. (website currently under construction)

TECHNICAL SUPPORT

Kuprion's internationally experienced engineers are available to provide in-depth technical assistance to you. Our team is knowledgeable in key areas of material science, chemistry and process engineering as it applies to electronics and semiconductor applications and is looking forward to help transition and integrate this material into your products.

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