MICROCOAT TECHNOLOGIES

McKinney, Texas, Cheshire, CT, Morrisville, NC USA
http://www.m-coat.com
Just like an old friend, we can do it all

Military

Microelectronics

Electronics

Medical

Conductive silvers

Encapsulants

Optically clear

Conformal coatings

Glass Bonders

MicroCoat Technologies, LLC
Optically Clear Glob Tops for IC’s, LED’s, EPROMS, Etc.

Without Silicone

- Refractive Index 1.49 - 1.91!!!!!!
- Transmissivity @ 990nm 99%
- R-I 1.9 @ 850 nm
- Operating Temperature Range of -55C to +150C

UV Curable in < 20 seconds!

MicroCoat Technologies, LLC
Optically Clear UV Cured Photo Cell Coatings
Optically Clear Coatings and Adhesives for:

- WADM Modules
- Modulators
- Attenuators
- Pump Lasers
- Switches
- Amplifiers
In electronics, thermal management is crucial in both the design of circuit-board assemblies and in the production of semiconductor materials. For PC boards a crucial aspect can be the heating or cooling power required to keep a circuit within its specified operating temperature range. In the manufacturing of silicon wafers it is important to maintain a very uniform temperature distribution across the wafer in order to achieve quality production processes and high yields.
Epoxy Sealing of Microelectronics, Semiconductors, Hybrids, and Power Devices

Non-conductive adhesives for lid sealing on any substrate surface; Ceramic, Kovar, LCP, etc. And also, substrate attach, die attach, etc. Passes gross leak, temp cycle, temp shock.

Withstands die attach to >320°C

MCT 3417
Hi Temp Sealing
Passes 320C Die Attach 5 minutes
Passes 350 Cycles -65C- +150C
Passes 85/85
Passes 883 Gross Leak

MicroCoat Technologies
Non-Conductive High Thermal Conductivity Die Attach Adhesive

MicroCoat 34-31-HTSM

A Single Component, Toughened, Microelectronic Grade non-Conductive Die Attach Adhesive with a Service Temperature of \(<-65^\circ C\) to Over \(>340^\circ C\), a Thermal Conductivity of 4W/mK and Meets NASA Low Outgassing Specifications

MicroCoat 34-31-HTSM is an Aluminum Nitride filled die attach adhesive that features a unique blend of high performance properties including both high shear and peel strengths along with convenient handling and high/low temp properties. This is a one component system formulated to cure at elevated temperatures.
Conductive Adhesives

- SMD Attach To PCB and Ceramic
- Screen Printing Traces
- Die Attach
- Solder Replacement
- Flex Silver Traces
- Flex Carbon Traces
- Anti-Static
- Chip Component Termination
- Tantalum Capacitor Termination
- Static Discharge
- Platable For SMD Components
- Quick-Set PCB Repair
- Bio-Sensors
- Silver Spray-On

- Low Outgassing Die Attach Adhesives
- UV/Heat Cure for High Accuracy Placement of Opto Devices

MicroCoat Technologies, LLC
A Very High Conductive & Thermally Conductive Die Attach Adhesive at >11W/mK – 100% Solids and Used Consistently at Over 60GHz

MCT 2-0404E-HTC

- **Composition Properties**
- Filler Contents: 85%-88% Silver
- Viscosity: 20-35 Kcps @ 10 RPM Brookfield HBT CP51 cone and plate.
- Thixo Ratio at above viscosity parameters: 1.25 – 2.55
- Average Particle Size: <.70 – 1.25 microns

- **Typical Cured Properties at Minimum Bond Line of 32 Microns**
- Volume Resistivity: <0.000055 Ω-cm
- **Thermal (Interfacial) Conductivity**: 11.0 – 11.9 W/mK
- $T_g$ °C: 128
We ARE 3D™

*Photo courtesy of Vertical Circuits, Inc.
16 Layer Stacked Die With SD0802C

MCT SD0802C
TC = >11.0W/mK

Non-Conductive Spacer

MicroCoat Technologies
MicroCoat SD0802C
Dispensing Die Stacking Conductive Adhesive
MicroCoat Technologies
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Unparalleled in Polymer Coatings and Adhesives Technology™

PRODUCT DATA SPECIFICATION

MCT SD0802C
A High Performance
Single Component, Refrigerated, High Thermal Conductivity, Very Low Resistivity
Conductive Epoxy for Inter-Connecting Silicon Stacked Die Layers

MicroCoat Technologies announces the arrival of their new low resistivity – high thermal conductivity die-stacking interconnect conductive adhesive MCT SD0802C. Many companies that are manufacturing stacked flash devices have gone to very fine line dispensed conductive adhesive instead of wirebonding to make the connections from layer to layer. MCT has developed a magnificent solution. It can be a dispensed bead or using high speed jet dispensing of conductive adhesive, the material can be applied at 50 microns wide with no sag or slump to 16+ flash layers (tested to date) with a day room temperature working life. Besides the cost and space savings compared to wirebonding the conductive paths provide an ground-breaking method for helping to cool the device(s) with the high thermal conductivity of the epoxy acting as cooling fins. It is shown that a 32MB 3D stacked DRAM cache can reduce the cycles per memory access of a NVIDIA GeForce 7900 Ultra by 13% and as much as 55% while increasing the peak temperature by a 14ºC increase in peak temperature. Voltage scaling can reach neutral thermals with a simultaneous 34% power reduction and 8% performance improvement, Bryan Black, et al, Intel Corporation.

This adhesive is a thixotropic silver-filled conductive non-frozen adhesive capable of dispensed line widths of 50 microns. It is 100% solids, and possesses good handling and storage properties. This silver-filled conductive adhesive is designed to bond from IC to IC on silicon with either gold or aluminum pads. It also bonds ICs and components to advanced substrates such as ceramic, PBGAs, CSPs and array packages with virtually no bleed. Hydrophobic and stable at high temperatures, the adhesive produces a void-free line with excellent interfacial adhesion strength. This material is formulated to provide high cohesive energy, adhesive strength, and elongation at break. Operating temperature range -55°C – 225°C; Short term to 300°C.

Composition Properties
- Filler Contents: 85% Silver
- Viscosity: Thixotropic
- Thixo Ratio at above viscosity parameters: 1.89 – 2.30
- Average Particle Size: 0.70 – 1.25 microns

Typical Cured Properties
- Volume Resistivity: .00015 – .00008mohms (Dispersed)
- Thermal Conductivity: 7.1-7.9 W/m-K
- CTE Alpha 1 ppm/C: 50
- CTE Alpha 2 ppm/C: 200
- Tg°C: 117
- Die Shear psi: >8000
- Shore “D” Hardness: 75 – 80
- Post Cure Ionics 883/5011.3.8.7: Cl<>6ppm, Na++<3.3ppm, K++<1.1ppm
- Teflon Flask 5 gm sample using 20-40 mesh, 50 gm DI H2O, 100°C for 24 hours
- Modulus: @65°C = 5595 MPa, @25°C = 5510 MPa, @150°C = 925 MPa, @250°C = 310 MPa

Processing Procedures:
- Mixing: The material should be lightly stirred prior to use if used from a jar. Not required if in a syringe
- Application: The material may be applied by screen printing or syringe dispense
- Curing: Cure at 150°C for 45 minutes. Optimum conditions will vary depending upon application and will need to be determined experimentally.
- Storage: MicroCoat SD0802C should be stored in sealed containers away from heat or flames. It has a shelf life of 4 days at a storage temperature of 25°C, 3 months at -10°C or 6 months at -40°C. Material may be returned to refrigerator/freezer after using partial syringes or jars.
- Packaging: 5cc, and 10cc syringes Shipped Unfrozen next day delivery only

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Super High Temperature Conductive Die Attach Adhesive to >650°C

- 85% Ag – NO ORGANICS
- NO Outgassing – NONE!, NADA!

Wirebonded Die
A795-VHT
Ni/Moly Tab
Eutectic Bond (Sn/Ge)
Au Pad
Substrate

Approved for a Hard Landing on Venus!!!!!!!
Product Data Sheet

MCT A795-VHT

APPROVED FOR A LANDING ON VENUS AT 450°C

An Electrically and Thermally Conductive, Silver Filled, Inorganic One-Part Adhesive for Use to >550°C

**MAY NOT BE DIRECT BONDED TO GOLD**

- Low Cure Temperature
- **Semiconductor Die Attach with Moly Tab for “Down the Hole Hybrids” or attach to Headers, Ag, Ni, Pd/Ag, Al, etc.
- Silicon die (no gold on back) to power headers
- Ceramic-to-Ceramic Heat Sink Bonding
- Substrate Attach to Nickel Plated Packages

Silver: 80% - 85% ~28 Micron
Viscosity: Thixotropic Paste
Pot Life: NA

Recommended Cure: 2 Hours Room Temperature Followed by 2 hours at 120°C.

For Vacuum Sealing Applications: ALL moisture is released between 300C-400C. After that there is absolutely no outgassing. Prior to final bake at temperature there are <.01ppm H2O moisture given off. It appears from lab testing that if you cure the product for an additional 2 hours at 150°C (after 1-2 hours at 120C) this will eliminate any further moisture release

Temperature Resistance: 1200°F (649°C)
CTE, in/in°F X 10⁻⁶ (°C) 9.6 (17.3)
Thermal Conductivity,
Btu-in/hr-ft²°F 63.1 (9.14 W/m-K)
Volume Resistivity (ohms-cm) .0002
Flip Chip Bumping Using Conductive Silver

- **Adhesive bumping** is a flip-chip bumping process that stencils electrically conductive adhesive over an under-bump metallization placed over the bond pad. The stenciled adhesive serves as the bump after it has been cured. Mounting of adhesive-bumped flip-chips also uses conductive adhesives.
Thanks Very Much

Sam Forman President/CEO
MicroCoat Technologies

Questions?