



# Applied Nanotech, Inc.

A PEN Inc company

3006 LONGHORN BLVD., SUITE 107 AUSTIN, TX 78758  
PHONE (512) 339-5020 □ FAX (512) 339-5021 □ WWW.APPLIEDNANOTECH.NET

## CuNi-OC5050

### Copper-Nickel Alloy Ink

ANI's CuNi-OC5050 is a copper-nickel alloy (50/50) ink suitable for printing lines and patterns useful for printed resistors, strain gauges, thermopiles and thermocouple applications. CuNi-OC5050 can be printed and cured to form conductive patterns on substrates such as silicon, ceramics and Kapton. The CuNi-OC5050 contains copper-nickel alloy nanoparticles ranging in size from 20-40nm. CuNi-OC5050 is solvent-based and can be printed by inkjet printing but is optimized for aerosol jet printing techniques. Printed copper-nickel alloy ink on plastic substrates can be photosintered in atmosphere to produce conductive copper-nickel alloy traces.

#### Typical properties

Part number	CuNi-OC5050
Particle Size	20-40 nm
Resistivity	200-300 mΩ/sq for 2μm film
Solid Content	50 wt%*
Viscosity	8-18 cP**
Surface Tension	26-31 mN/m
Solvent	Organic

\* Available from 10-50 wt%

\*\* Measured at 10rpm and 25C with Brookfield LV-1+ viscometer



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## Application Notes

### CuNi-OC5050 Copper-Nickel Alloy Ink

#### Description

ANI's CuNi-OC5050 is a copper-nickel alloy ink suitable for printing lines and patterns useful for printed resistors, strain gauges, thermopiles and thermocouple applications. CuNi-OC5050 can be printed and sintered to form conductive patterns on substrates such as silicon and polyimide. CuNi-OC5050 can be printed by inkjet but is optimized for aerosolized jet platforms.

#### Storage and Shelf Life

CuNi-OC5050 ink should be stored in a tightly sealed, leak-proof container at 3-10°C. Storage in freezers is not recommended. CuNi-OC5050 can be stored up to 3 months.

#### Safety and Handling

When working with CuNi-OC5050 ink, use adequate ventilation and wear appropriate protective gear. CuNi-OC5050 can cause eye and skin irritation. The following precautions should be taken when handling CuNi-OC5050 ink:

- Read the Safety Data Sheet (SDS)
- Avoid prolonged breathing of vapor
- Use appropriate safety equipment such as gloves and eye protection
- Wash hands thoroughly after handling
- Keep the paste container closed when not in use to
- prevent drying and spilling

#### Processing Procedures

##### Pre-processing

- Soft-settling is expected with CuNi-OC5050 ink. The CuNi-OC5050 ink requires manual agitation (mix or stir) followed by sonication for 15 minutes.
- After sonication, the ink should be filtered using a 1 micrometer pore size glass fiber filter (PALL Acrodisc □ 25mm 4523-T recommended).

##### Printing

- Printing has been demonstrated using inkjet, aerosolized jet, and wire rod draw-down. Conditions will vary based on technique and substrate.

##### Drying

- Printed ink can be dried at 100°C for 30 minutes in ambient atmosphere.

##### Sintering

- CuNi-OC5050 ink <5µM thickness printed onto flexible substrate materials can be photosintered using a xenon arc-discharge lamp system (Xenon 2000). The sintering parameters are 2msec single-pulse 2.0kV – 2.2kV; distance from lamp to sample is 3cm. Conditions will vary based on substrate.
- CuNi-OC5050 ink can be thermal sintered at temperatures >350°C in a reducing atmosphere (Hz = 4% in N<sub>2</sub>) for 20 minutes.

##### Clean-up

- Follow appropriate cleaning procedures for equipment used to dispense CuNi-OC5050 ink. Excess ink can be removed with ethanol, IPA, or acetone.

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