



# Applied Nanotech, Inc.

a PEN Inc. company

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## AI-IS1000

### Aluminum Ink

ANI's AI-IS1000 is an aluminum ink suitable for conductive applications in the silicon photovoltaic's industry. AI-IS1000 is spray printed and thermally cured to form conductive patterns on silicon substrates. The small particle size allows for non-contact application including spray coating and direct-print that are compatible with next generation thin (180µm) Si wafer technologies. AI-IS1000 aluminum ink is glass frit free utilizing proprietary polymers to achieve passivation layer diffusion. Our aluminum ink is lead and cadmium free.

#### Typical properties

<b>Part Number</b>	<b>AI-IS1000</b>
<b>Sheet resistance</b>	<b>&lt;10 mΩ/sq*</b>
<b>Viscosity</b>	<b>80-120* cP</b>
<b>Dried thickness</b>	<b>10-30 µm</b>
<b>Fired thickness</b>	<b>5-25 µm</b>
<b>Bowing (160 µm wafer)</b>	<b>&lt;1mm</b>
<b>Back Surface Field thickness(BSF)</b>	<b>up to 10 µm***</b>

\* Sheet resistance is function of firing temperature

\*\* Measured at 10rpm and 25C with Brookfield DV-E concentric cylinder viscometer

\*\*\* BSF thickness is process temperature dependent



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## Application Notes:

### Al-IS1000 Aluminum Ink

#### Description

ANI's Al-IS1000 aluminum ink is formulated for non-contact printing techniques, such as spray and aerosolized jet printing. The aluminum ink is designed for silicon wafer-based photovoltaic applications. The aluminum ink has low contact resistivity on silicon. Additionally, Al-IS1000 will form a highly uniform Back Surface Field (BSF) layer. Al-IS1000 ink is lead and cadmium free.

#### Storage and Shelf Life

Al-IS1000 aluminum ink should be stored in a tightly sealed leak-proof container in a cool dry place. Al-IS1000 aluminum can be stored for up to 6 months.

#### Safety and Handling

When working with Al-IS1000 aluminum ink, use adequate ventilation and wear appropriate protective wear. Al-IS1000 aluminum can cause eye and skin irritation. The following precautions should be taken when handling Al-IS1000 aluminum ink:

- Read the Material Safety Data Sheet (MSDS)
- 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*

- Al-IS1000 has a high viscosity when in storage. Shake or stir to lower the viscosity before use.
- Sonication is not recommended.

##### *Printing*

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

##### *Drying*

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

##### *Sintering*

- Low-temperature sintering: printed aluminum ink on silicon can be sintered as low as 550°C. Conditions will vary based on substrate.
- High-temperature sintering: printed aluminum ink on silicon can be sintered from 700-900°C for <1 minute in air. Conditions will vary based on substrate.

##### *Clean-up*

- Follow appropriate cleaning procedures for equipment used to print Al-IS1000 ink. Excess ink can be removed with ethanol, IPA, or acetone.

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