



Applied Nanotech, Inc.

a PEN Inc. company

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Al-PS1000

Aluminum Paste

ANI's Al-PS1000 is an aluminum paste suitable for conductive applications in the silicon photovoltaic's industry. Al-PS1000 aluminum paste has low bowing and is required less wet weight to produce same cell performance for silicon solar cells. The product can be fired over a large range of processing conditions including co-fire process with front contact silver inks. Our aluminum paste is lead and cadmium free.

Typical properties

Part Number	Al-PS1000
Sheet resistance	<10 mΩ/sq*
Viscosity	20,000-50,000 cP**
Dried thickness	20-30 μm
Fired thickness	20-25 μm
Bowing (160 μm wafer)	<1.4 mm
Back Surface Field thickness(BSF)	up to 10 μm***

* Sheet resistance is function of firing temperature

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

*** BSF thickness is process temperature dependent



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Application Notes:

Al-PS1000 Aluminum Paste

Description

ANI Al-PS1000 aluminum paste is formulated for screen printing techniques. The aluminum paste is designed for silicon wafer-based photovoltaic applications. The aluminum paste has low contact resistivity on silicon. Additionally, Al-PS1000 will form a highly uniform Back Surface Field (BSF) layer. Al-PS1000 paste is lead and cadmium free.

Storage and Shelf Life

Al-PS1000 aluminum paste should be stored in a tightly sealed leak proof container in a cool dry place. Al-PS1000 can be stored for at least 6 months.

Safety and Handling

When working with Al-PS1000 aluminum paste, use adequate ventilation and appropriate protective gear. Al-PS1000 aluminum can cause eye and skin irritation. The following precautions should be taken when handling Al-PS1000 aluminum paste:

- 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

- A mixing process is recommended to obtain homogeneous paste before use.

Printing

- Printing can be done using a screen print or wire rod coating process.
- Recommended screen print parameters:
 - Screen Mesh – 250-325
 - Emulsion thickness – 12 micron (0.5mil)
 - Contact Force ~15 kg
 - Print speed ~100 mm/s
 - 60 deg trailing edge
 - 70-75A Durometer polyurethane squeegee
- Recommend wire rod #10

Drying

- Printed paste can be dried in a belt furnace at 230°C peak temperature, or in a convection oven at 100°C for 30 minutes in ambient atmosphere.

Sintering

- Printed aluminum paste 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-PS1000 paste. Excess paste can be removed with ethanol, IPA, or acetone.

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