Heraeus

Product Spotlight
SOL9610 Series Patent Pending

New Generation of Higher Efficiency Front-side Pastes

SOL9610 Series metallization materials were formulated to meet the needs of high efficiency emitter structures. Building on the technology of the SOL9600 materials, our newest pastes demonstrate further improvements in contact quality and fine line print capabilities. These translate to higher efficiencies and further reductions in paste consumption.

The SOL9610 Series are front-side Ag conductor pastes for fine line screen printing applications on mono and multicrystalline silicon solar cell wafers. They effectively etch SiN_x:H and/or SiO_x passivation layers during the co-firing process and provide low contact resistance. The benefit of SOL9610 is maximized at finger line openings of 35-55 µm, offering improved transfer and line definition.

SOL9610's excellent manufacturability lowers cell's cost per watt by providing higher throughput and cosmetic yield. Also, our "High Performance Binability" provides cell manufacturers with a very tight and high cell output power/efficiency distribution, increasing the value of their production. Please contact your Heraeus representative for the version that best fits your manufacturing process.

Key Benefits

- Higher cell efficiency
- Low series and contact resistance
- Finer line resolution
- Lower paste consumption per cell
- Excellent thick ribbon solderability
- Excellent manufacturability
  - High cosmetic yield
  - Higher throughput speed
  - Outstanding printability
  - Wide processing window
  - High performance binability

Typical Properties

Viscosity:

HBT Cone and Plate Viscometer (Brookfield)

- 120 – 250 kcps
- CPE-51 spindle, @ 1 RPM, 25°C

Cone and Plate Viscometer (Haake)

- 12 - 20 Pas;
- Plate/cone (O = 20 mm, angle = 0.5°), @ 100 s-1; 25 °C

Solids:

90.5 ± 1%

Solderability:

- Sn62, SAC305
- Use with low solids, no clean flux

Further Contact Resistance Improvement

Our newly formulated Heraeus SOL9610 Series surpasses the performance of our SOL9600 Series with additional improvement in contact resistance providing higher conversion efficiencies. Figure 1 shows a 33% reduction in contact resistance relative to our previous generation of paste. This improvement in contact resistance has demonstrated an average of 0.17% absolute efficiency improvement at beta customer sites.

Figure 1. Trials at customers' sites have demonstrated a 33% reduction in contact resistance and an average efficiency improvement of 0.17% absolute using the SOL9610 Series.

It is well known that a low surface concentration of dopants in Si wafers typically results in poor contact formation between the paste and wafer after firing. Heraeus' R&D scientists continue to make advancements in our paste development to overcome technical challenges that improve cell performance. SOL9610 is especially designed for high ohmic emitters with low surface concentration. By changing the paste chemistry, we are able to grow a much higher density of silver crystallites, especially on lowly doped surfaces, which significantly improve contact properties (see figure 2).

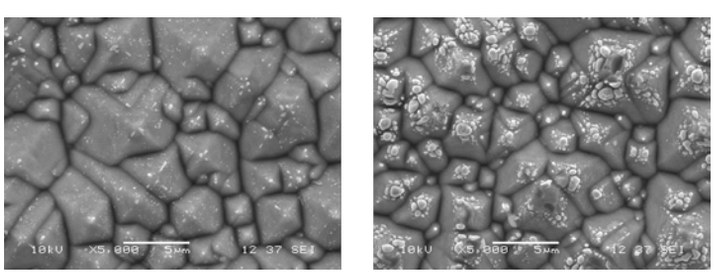


Figure 2. Crystal formation on a high ohmic emitter with old generation paste (left) and current generation paste (right).

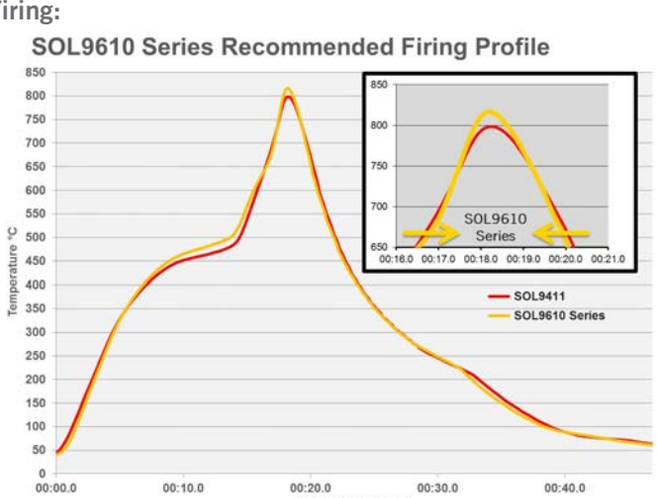
Recommended Processing Guidelines

Printing:

Design Finger Line Opening	Screen Parameter Recommendations
35 - 55 µm	290 mesh, 20 µm stainless steel wire 360 mesh, 16 µm stainless steel wire 400 mesh, 18 µm stainless steel wire Note: 15 µm EOM typical
Squeegee	70 - 75 Shore
Squeegee Speed	≥ 180 mm/sec
Squeegee Pressure	60 – 90 N
Flood Speed	≥ 300 mm/sec

Drying: Typically dried in an IR dryer with set points of 250-300°C in less than 20 seconds or 150°C for 10 minutes in circulated air oven.

Firing:



Note: The above firing profile is a standardized recommendation for a profile optimized to your process, please contact your Heraeus Technical Service representative.

Thickness (fired): 15 - 25 µm

Storage: Store in a dry location at 5°C – 25°C. DO NOT REFRIGERATE.

Allow paste to come to room temperature prior to opening. Mix well before using.

Heraeus

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