

SOL9641A Series



SOL9641A
 $> +0.1\%$
 Eta gain

efficiency

Patent Pending

FRONT-SIDE PASTE



Front-side Paste for Black-Silicon Cell

- Specially formulated for contacting Black-Silicon texture
- Superior adhesion on Black-Silicon cell
- Single, double-printing and Knotless™ Screen packages available

As the PV industry continuously improves cost-to-performance ratio, for the multicrystalline cell, the diamond-wire cut wafer with Black-Silicon texture is the new avenue to achieve such goal. The nano-structured Black-Silicon surface prepared by special texturing process (such as RIE and MCCE) boots efficiency gain, but also gives challenge to metallization paste. Heraeus SOL9641A series front-side silver paste was specially re-designed for Black-Silicon texturing. It features with:

- Unique glass chemistry for contacting unique silicon surface
- Fine-tuned organic media matching “nano-structured” surface morphology

The SOL9641A has been developed based on our patent-pending glass chemistry, combined with the latest breakthrough in organic vehicle system for ultra-fine-line printing (UFL).

SOL9641A has a wide firing window, which makes the paste specifically suitable for the application on PERC solar cells. The patent-pending paste technology provides excellent adhesion, which is almost two times higher than SOL9631 Series.

KEY BENEFITS

- Outstanding efficiency gain on Black-Silicon cell
- Ultra-fine-line (UFL) screen printing for mass production
- Superior adhesion and reliability (on conventional texture and Black-Silicon)
- Wide firing window

GOOD METALLIZATION CONTACT ON BLACK-SILICON WITH GREAT ADHESION

The SOL9641A features a unique glass chemistry, in which >45 years of experience and expertise in glass development for the thick film paste industry are incorporated. This key ingredient, exclusively developed and manufactured by Heraeus, enables the tolerance of low firing temperatures. Such unique glass chemistry was optimized for nano-structures on Black-Silicon, achieve the well-balanced metallization contact and Voc. SEM image (Right side) of interface under 9641A finger that shows optimal amount of silver crystallites. The left side image is the interface of a reference paste with poor contact.

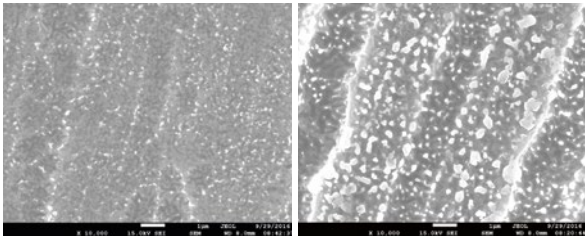


Figure 1: SEM of reference paste (left) on Black-Silicon: Rarely grown silver crystallites with poor contact; SOL9641A (right): Optimal amount of silver crystallites on Si-surface provides well-balanced contact and Voc

After low temperature firing the microstructure of the fired finger shows a much more densified structure including the Ag-Silicon interface, enhancing adhesion, grid resistivity and solder ability.

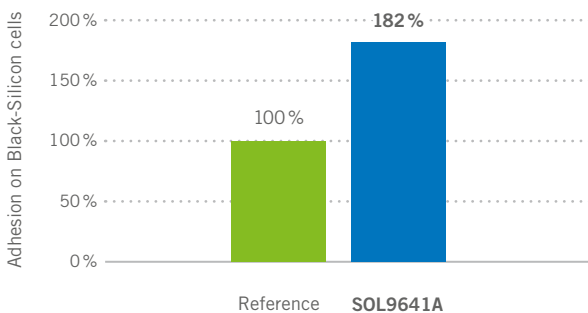


Figure 2: SOL9641A has great adhesion on Black-Silicon cell

The SOL9641A is perfectly tailored for Ultra-fine-line printability for screen printing that can print defect-free through a less than 30 µm screen opening.

TYPICAL PROPERTIES

Wafer types:

- Multicrystalline Black-Silicon cell

Recommended finger opening:

Single Print: 28–45 µm

Double Print: to be optimized based on customer case

Solid content: 91.00 ± 1.0%

Fineness of Grind (FOG):

- 4th scratch: ≤ 10 µm

- 50%: ≤ 5 µm

Viscosity:

SOL9641A: CPE-51 spindle (Brookfield):

50–140 kcps at 1 RPM, 25°C

RECOMMEND PROCESSING GUIDING PRINTING

Printing: Screen parameter recommendations with stainless steel screen:

≥ 28–45 µm opening:

- calendared 360 mesh, 16 µm or

- calendared 430 mesh, 13 µm or

- calendared 325 mesh, 16 µm

- EOM thickness: 12–20 µm

Drying: Typically dried in an IR dryer with set points of 250–300°C in less than 30 seconds or 150–200°C for 10 minutes in circulated air oven.

Firing:

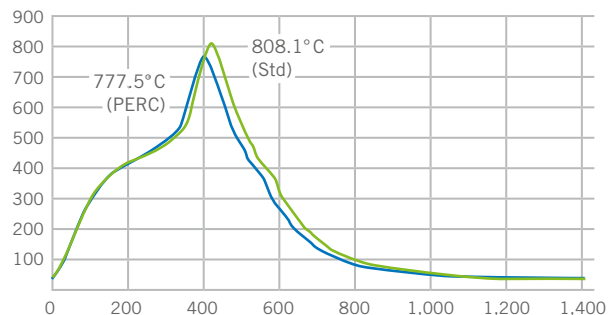


Figure 3: Co-firing Study multi PERC

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

Storage:

Store in a dry location at 5°C–25°C.

Stir well before using.

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