Heraeus, the technology leader, closely following the industry trend, has developed the SOL9651B series based on the paste chemistry upgraded from last generation for ULDE (Ultra Lightly Doped Emitter) with Selective Emitter (SE), combined with the latest improvement in organic vehicle system for UFL (Ultra-Fine-Line) printing. As confirmed by customers, SOL9651B has efficiency gain >0.10% in mass production.

SOL9651B is an evolutionary product family designed for advanced PERC (Passivated Emitter Rear Contact) technology. Such paste chemistry provides a wide firing window toward lower temperature side, which makes this series well-performed on PERC. It is worth mentioning that the 9651B formulation also allows our local PML (Product Modification Labs) to do quick and efficient customization for versatile customer applications.

**KEY BENEFITS**

- High Voc, extra protection on laser damaged Selective Emitter
- High FF, superior contact for further diffusion optimization
- Fine-line printing for better efficiency and mass production

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UNIQUE PASTE CHEMISTRY DESIGNED FOR SELECTIVE EMITTER PERC CELL

Driven by ULDE in c-Si solar industry, the cell manufacturers are trying different technologies to boost cell efficiency; Selective Emitter by laser doping from phosphosilicate glass is a promising one.

Continued innovation from last generation, SOL9651B features a unique patent pending glass frit and silver combination, enabling the tolerance of wide firing temperatures and emitter protection. SOL9651B successfully overcome the challenge of contacting ULDE (~10⁻¹⁹ dopant concentration) and also ensure the less damage under laser-processed SE area under metallization finger. Such features bring out the most benefits of ULDE, such as higher Isc and Voc, therefore boosts the cell efficiency.

FURTHER IMPROVED ULTRA-FINE-LINE PRINTABILITY

The SOL9651B is perfectly tailored for Ultra-fine-line printability for screen printing. It supports a finger geometry that can print defect-free through a less than 28 μm screen opening in high throughput mass production.

**TYPICAL PROPERTIES**

**Solids:** 91.0 ± 1%

**Viscosity:**

SOL9641B:

- CPE-51 spindle (Brookfield):
  - 80 – 150 kcps @ 1 RPM, 25°C

**Fineness of Grind (FOG):**

4th scratch: ≤10 μm
50 %: ≤5 μm

**Wafer Types:**

- Monocrystalline with Selective Emitter on ULDE
- Multicrystalline by Diamond-Wire-Cut

**Recommended finger opening:**

Single Print: 25 – 40 μm
Double Print: can be optimized based on customer case

**RECOMMENDED PROCESSING GUIDELINES**

**Printing:** screen parameter recommended:

- 25 – 45 μm opening:
  - calendared 360 mesh, 16 μm
  - calendared 440 mesh, 13 μm
  - calendared 325 mesh, 16 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:**

A typical firing profile for Mono ULDE PERC cell

```
800 700 600 500 400 300 200 100

782.4°C
```

**Storage:**

Store in a dry location at 5°C – 25°C.