

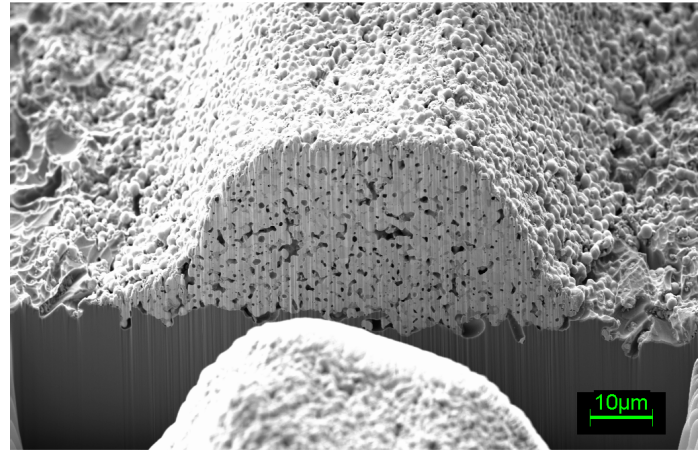
## Silver double print using sunstence<sup>®</sup> uni / sunstence<sup>®</sup> me

**nb technologies**  
consulting engineers



In order to decrease the line resistance of screen printed solar cell metallisation, a higher print thickness at same line width can be desired for efficiency increase. Thickness restrictions of present Ag screen printing can be overcome by adding extra Ag by aligned double step printing.

On the list of metallisation enhancements, the **double print of Ag** may be considered the most applicable and available solution without fundamental change of process technology, as long as CoO is beneficial at higher Ag consumption. More benefit on CoO with metallisation enhancements is possible with approaches such as plating on Ag paste seed or direct plating on silicon without any Ag at all. In return, those approaches involve more efforts to be implemented in production.



FIB cut of Ag paste finger; double-printed and fired; 80µm width, 28µm height

The **sunstence<sup>®</sup> uni** and **sunstence<sup>®</sup> me** meet the main requirements on Ag double print and are unmatched by any conventional mesh screen regarding **high accuracy alignment** and **stability of relative position of the image** (no stretch out) over full life time exceeding 20.000 prints.


**NEW**

NBT has recently advanced on the double print method (patent pending), where the second print is performed using the **sunstence<sup>®</sup> me s** (single-layer metal stencil), which provides capability for more than **40µm silver print thickness in a single step**.

The **sunstence<sup>®</sup> uni** is the first screen qualified in December 2009 for double printing on the **Baccini Esatto Technology™** from **Applied Materials Baccini Cell Systems**.

### **Major benefit of Ag double print using sunstence<sup>®</sup> uni / sunstence<sup>®</sup> me**

- enhancement of metallisation and cell efficiency using established screen print technology
- reduced printing force capability provides soft contact print and less breakage risk
- independent Ag thickness in busbar (needs less) and finger (needs more)
- total silver reduction of 30 to 50% increases CoO benefit
- unmatched alignment accuracy and image position stability
- line width 70µm/60µm to 90µm/80µm at ~ 25µm to 30µm thickness depending on paste
- life time >20.000 prints (uni, 90.000 prints reported for individual screens) and >50.000 (me)

**sunstence<sup>®</sup> uni** and **sunstence<sup>®</sup> me** are distributed under the **sunstence<sup>®</sup>** family by Hans Frintrup GmbH. 

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