In a line of advanced metallisation concepts starting from multi-print of Ag and plating on screen printed Ag seed, direct plating on silicon has the potential for 20% efficiency mono-Si cells without selective emitter as well as CoO reduction up to 0.10 Euro per wafer, depending on approach and options.

NBT has identified and advanced on the crucial pieces for succeeding in direct plating concepts:
- screen printing of resist (HF compatible) as etch mask, nitride protection and plating mould
- wet-etch patterning of nitride
  (preferred to etch paste (cost and residue) and LASER ablation (cost and damage))
- patterned porous silicon on emitter for thickness-limited Ni-silicide formation at low temperature, enabling to contact high-ohmic emitters without selective emitters
- specialised Ni-electroplating solution sunNiSi for etching porous silicon and plating of Ni from a single bath at RT
- solvent-free cleaning solution to remove resist after the metal stack is completed
- aligned multiple screen prints (sunstence® uni / sunstence® me) usable for the combination of screen printed etch pastes, resists and Ag paste metallisation

Approaches
The wet processing steps are enabled by NBT’s single-side/backside-dry suncup® plating tool concept (patents pending). Different approaches are possible:
1. Ag is plated directly on silicon after nitride patterning with superior adhesion (patented)
2. Porous silicon is formed (e.g. 5% HF) prior to plating Ni/Cu/Sn stacks in the screen printed resist serving as etching mask, nitride protection and plating mould. The Ni-silicide is formed at 350°C and limited to the porous silicon thickness. In contrast to electroless Ni coatings on silicon, the electroplated Ni shows superior adhesion directly after plating (patent pending).
3. The patterned porous silicon is contacted with screen printed Ag paste. The benefit of porous silicon is the high contact area that is contacted directly without firing through the nitride (patent pending).

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