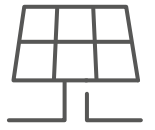


# Solar cells



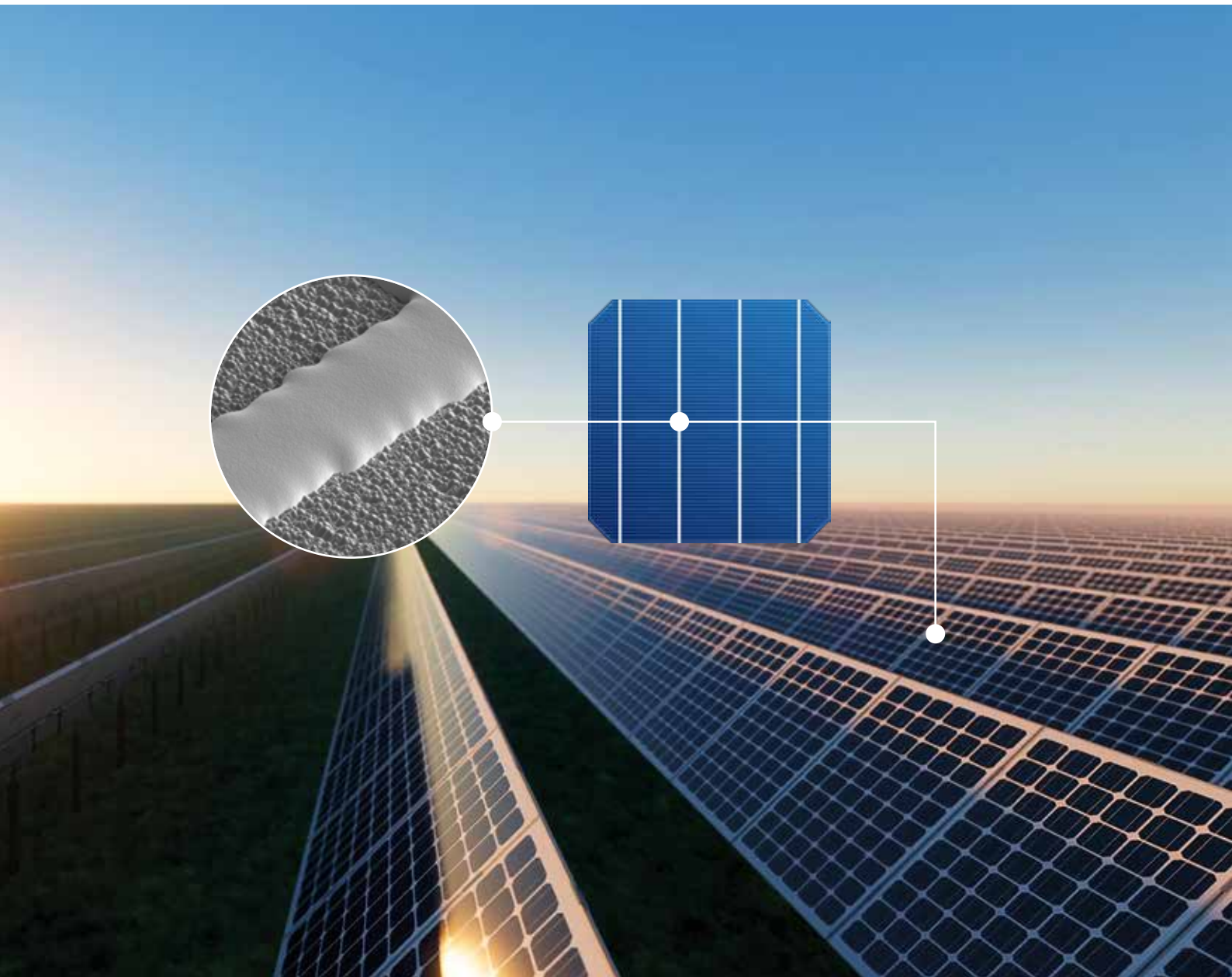
Alternative metallization process for efficient solar energy production

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General Metal Finishing

Decorative coatings

atotech.com



# Plated metallization

## The sustainable alternative to silver screen-printing

The transition away from fossil-fuel based power sources is trending in a new, more sustainable direction. Massive growth in the photovoltaic market will continue to be seen in the coming years.

## Future limitations on silver supply

Given expected production boosts, an application of silver-based contacts can result in critical constraints of silver supplies needed for this fast growing market. The improvement of silver screen-printing alone will not overcome these limitations. Therefore, the industry seeks an alternative metallization processes.

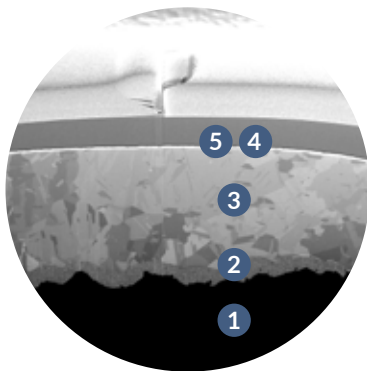
## Plating of contact fingers and busbars

An advantageous sustainable alternative to the traditional silver screen-print is plated metallization. Apart from reducing the consumption of critical resources, plated contacts offer further benefits. The ductile and low stressed copper contacts help to improve the overall cell efficiency and thus, increase the yield. The versatile plating processes can be adapted to different cell types and designs. Being in mass production for long time, MKS' Atotech plating processes have proven to be a true alternative to the standard screen-printing method.



# Revolutionary processes for more efficient solar energy production

Electroplating of the contact fingers on solar cells offers an increased cell efficiency at a significant lower material cost. The plated Ni / Cu / Ag and Ni / Cu / Sn contacts exhibit an increase in performance compared to the conventional screen-printed contacts.



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## 1 Pretreatment

The mild acidic pretreatment effectively removes oxides. Additionally, the wettability of the cell's surface will be improved, particularly in areas with fine structures, and at resist interfaces.

**CupraPro® PV 8:** Acid cleaner for wetting and oxide removal

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## 2 Nickel plating

The thin nickel seed layer acts as an interface that builds the contact to silicium. Nickel also constitutes as a barrier layer for the subsequent buildup of copper fingers and busbars.

**Nimate® PV:** Nickel process as seed layer and diffusion barrier

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## 3 Copper plating

The highly conductive copper fingers provide excellent electrical behavior. The low stressed and ductile composition also helps to withstand mechanical impact.

**Cupracid® PV family:** Tailored for operation in current densities ranging from 2 up to 25 ASD

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## 4 Tin plating

The tin surface finish ensures solderability for a reliable cell connection. The protective layer also shelters the copper from any environmental impact.

**Stannacid® PV:** Standard tin process

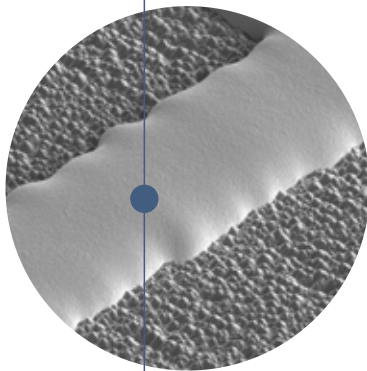
**Niveostan® PV 20:** High speed tin process

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## 5 Silver plating

As an alternative for the tin layer, silver applications can also be an option. Applied as an immersion or an electrolytical final finish, the deposited silver flash perfectly prepares the surface for the soldering processes.

**Argalux® PV:** Silver capping layer



# Atotech offers a comprehensive range of processes for the metallization of solar cells



## Solutions for the solar industry

Atotech provides sustainable and economic plating solutions for the grid metallization of c-Si solar cells. Our production proven advanced technology supports the future needs of the photovoltaic industry.



## Global presence

With a global presence in more than 40 countries, Atotech is the approved choice of OEMs and Tiers worldwide. You can expect nothing less than first-class service and customer support.



## Best local service

Atotech currently has 14 TechCenters forming a global network that provides efficient customer support, from pilot production, chemical and material science investigations, and process qualifications, to train customers and partners.



## Leading technologies

R&D is the backbone of our success. We regularly work directly with end customers and OEMs to co-develop new ideas that drive product innovation.



## Production know-how

Paired with our broad production know-how, our highly skilled personnel and manufacturing capabilities make us the trusted partner within our industry.



## Sustainable solutions

Our processes comply with the latest environmental legislation. MKS' Atotech sustainable solutions are free of many hazardous and regulated compounds as well as use water, energy, and raw materials efficiently.

