SiNA®/MAiA®

The modular inline system for PECVD anti-reflection coating and passivation layers

**High performance at lowest cost**

- **Industrially proven** high-throughput PECVD reactor
- Over 700 systems and ~60 GW installed capacity
- **Best cost of ownership** – optimum of process quality and costs
- **Modular platform** system for high flexibility in throughput and technology
- **High capacity up to 140 MW** – throughput scalable up to 3,400 wafers/h
- **Best footprint utilization** (best TpT/m²)

**SiNA® – Leading inline anti-reflective coating system**

- Standard solution for sunny side SiN anti-reflective coating
- High uptime ≥ 94%
- **Best yield** – continuous material flow due to continuously operating coating process
- Profit from the experience of 530 shipped machines and ~40 GW production capacity
- Qualified for PERC and PERT cell concepts

**MAiA® – Multiple Application inline Apparatus for various coating processes**

- Standard solution for rear side AlOx + SiN passivation
- High uptime ≥ 93%
- Deposit different dielectric layers without vacuum breakage in one run
- Profit from the experience of 180 shipped machines and ~20 GW production capacity
- Qualified for PERC and PERT cell concepts

**Increase cell efficiency through PERC upgrade with MAiA® system**

- Easy upgrade of standard Al-BSF cell lines to PERC technology
- Two process steps and equipments only
- **Stay competitive with significant cell quality increase**
  - Mono PERC cell efficiency: >21.5% (~1.0% efficiency gain) ➔ +15 W module power increase
  - Multi PERC cell efficiency: >20% (~0.7% efficiency gain) ➔ +10 W module power increase
- Lowest additional production costs ensure profitability and short ROI
- Minimize your risk – benefit from 10 years PERC experience and 20 GW installed PERC capacity
Leading PECVD coating platform

PECVD process

Amorphous hydrogenated silicon nitride (SiN) layers applied by Plasma Enhanced Chemical Vapour Deposition (PECVD) are well suited as anti-reflection and passivation layers on crystalline silicon solar cells. These layers reduce the ratio of reflection on the wafer surface resulting in better sunlight utilization and passivate defects on the silicon surface as well as in the crystal structure of the silicon bulk material by hydrogenation from the SiN layer. This leads to an improvement of the electrical properties of the silicon and thus to a considerable increase of the light conversion efficiency of the solar cell.
SiNA® - Industrially proven single application system

Meyer Burger belongs to the leading suppliers of PECVD equipment in the photovoltaic industry and has been working in this field for a very long time. SiNA® is an industrially proven PECVD reactor which has been designed especially for coating solar cells. The system is based on an inline concept where the wafer transport is effected by flat carriers. The highly productive microwave plasma sources provide a very homogeneous plasma with a high ratio of chemically active agents. Due to excellent coating results and long-term process stability, SiNA® systems feature a high uptime and low cost of ownership.

MAiA® - Flexible multi application system

Some novel solar cell concepts require further and new coating techniques. An upgrade of the existing standard line is the most efficient approach to meet this demand. Meyer Burger accommodates this demand for flexibly configurable coating equipment with the MAiA® platform. MAiA® is a development of the proven anti-reflection coating equipment SiNA® and is capable of coating both front and back side of the wafers with materials like silicon nitride, silicon oxide or aluminium oxide within one machine and in one run.

MB PERC solution

PERC is an upgrade technology for standard Al-BSF solar cells which increases efficiencies by using aluminum oxide (AlOx) passivation and a silicon nitrate capping layer to improve the transformation of solar energy into electric energy. SiNA® and MAiA® systems are combined with evaluated PERC baseline recipes which are supported and optimized during machine ramp-up. Compared to other solutions, no additional wet bench or heating step is required.

The Meyer Burger approach offers a solution using existing equipment to guarantee high-quality solar cells and excellent customer profitability and to prepare for changes in the market environment.
**Technical data at a glance**

<table>
<thead>
<tr>
<th></th>
<th>SINA® 3400</th>
<th>MAIA® 2.1 3400</th>
<th>MAIA® EVO 3400</th>
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</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
<td>Silicon nitride (SiN) deposition</td>
<td>Silicon nitride (SiN) + aluminum oxide (AlOx) deposition</td>
<td>Silicon nitride (SiN) + aluminum oxide (AlOx) deposition</td>
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<tr>
<td><strong>Module configuration</strong></td>
<td>L 6PM U</td>
<td>L 4PM T 6PM U</td>
<td>L 4PM T 5PM 6PM U</td>
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<tr>
<td><strong>Gross TpT [wph]</strong></td>
<td>≤ 3,400</td>
<td>≥ 3,400</td>
<td>≥ 3,400</td>
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<td><strong>Uptime</strong></td>
<td>≥ 94%</td>
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<td>≥ 93%</td>
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<tr>
<td><strong>Yield – (mech./optical)</strong></td>
<td>≥ 99.5% (99.9% / 99.6%)</td>
<td></td>
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<tr>
<td><strong>No. of plasma sources</strong></td>
<td>6 SiN</td>
<td>2 AlOx + 6 SiN</td>
<td>2 AlOx + 6 SiN + 6 SiN</td>
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<tr>
<td><strong>Wafer / tray [pcs]</strong></td>
<td>24 (6 × 4)</td>
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<td><strong>Wafer specification</strong></td>
<td>All common available wafer sizes can be processed, the number of wafers per tray and system throughput may thus vary accordingly. Nominal wafer size 6” (156 - 157 ±1 mm)</td>
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**General platform module functionality**

Shown on the right side: SINA® 3400 for silicon nitride deposition.

**Example layout MAiA® 2.1 3400**

- **Length:** 11.95 m
- **Width:** 5.08 m
- **Height:** 3.00 m