HELiAPECVD
HJT COATING SYSTEM

High quality deposition system for heterojunction solar cells
Lowest impurity
Best passivation quality
Stable and uniform process
Cross contamination free deposition
High Efficiency Low impurity Apparatus

High-quality amorphous silicon (a-Si) layers are a key factor in producing high-efficiency heterojunction solar cells. Both intrinsic a-Si layers for manufacturing heterojunction cells can be deposited with a PECVD (plasma enhanced chemical vapor deposition) process. Meyer Burger’s HELIAence has a special patented plasma reactor – the S-Cube™ – for this a-Si deposition. This ensures that a-Si layers with outstanding electrical and passivation properties are deposited homogeneously and result in an unrivaled passivation quality.

PECVD Process for heterojunction cells

The silicon Heterojunction Technology (HJT) is an appealing concept that combines thin amorphous silicon layers with monocrystalline silicon wafers to realize cell efficiencies above 24% (GT intrinsic) in production average. The simple structure of the HJT cells needs less processing steps compared to conventional cell designs. The excellent surface passivation of the a-Si:H layer results enables a high cell efficiency potential. The excellent temperature coefficient of TC = -0.25%/K results in a higher energy yield at operating conditions. Low temperature processing (< 250°C) is compatible with the use of thin wafers.
Best passivation quality and carrier lifetime up to 12 ms

Closed front and back side process suites perfect to HJT bifacial design

Stable and uniform process

Best cell efficiency

Optimized plasma for PV applications

In-Situ cleaning of deposition chambers and carriers

Lowest impurity; No cross contamination
**Innovative cluster concept**

All PECVD deposition steps are performed within a closed cluster system which prevents cross contamination of intrinsic passivation layers at p/n interface. Competitors using same tray for p- and i-layer and therefore suffer from contamination.

**Transport tray always hot**

The wafer transport tray is always on process temperature. Therefore, no heat up time in transport module (TM) and process module (PM) needed. HELiA PECVD enables 60 seconds process time and only 24 seconds handling time in the process module (PM) at 2,400 wph.

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**Diagram:**

- **Stripe 1 (i/n)**: Frontside
- **Stripe 2 (i)**: Backside
- **Stripe 3 (p)**: Backside

<table>
<thead>
<tr>
<th>PM</th>
<th>PM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>i/n</td>
<td>i</td>
<td>p</td>
</tr>
</tbody>
</table>

**Legend:**
- **TM**: Transfer Module
- **PM**: Process Module
- **Load Table**
- **Flipper**
- **N2 Housing**
- **Load from cassette**
- **Unload from cassette**
- **Wafer movement**
- **Tray movement**
S-Cube™ Process Chamber Reactor

Unique chamber design
Meyer Burger has developed an unique and patented box-in-box design. This allows highest purity layers and a very good passivation on heterojunction cells.

No cross-contamination
Best passivation quality
Strong differentiation to competitors

Specifications

S-Cube™

<table>
<thead>
<tr>
<th>Process Features</th>
<th>Process Description</th>
<th>NF3</th>
<th>Ar</th>
<th>H2</th>
<th>SiH4</th>
<th>PH3</th>
<th>H2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-Si:H</td>
<td>Plasma deposition of the intrinsic layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>a-Si:H(n)</td>
<td>Plasma deposition of the n-doped layer</td>
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<tr>
<td>a-Si:H(p)</td>
<td>Plasma deposition of the p-doped layer</td>
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<tr>
<td>In situ clean</td>
<td>Chamber clean (etch process)</td>
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<td></td>
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</tr>
</tbody>
</table>

Equipment Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle Time per tray</td>
<td>84 s</td>
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<tr>
<td>Wafers on tray (6&quot;)</td>
<td>7 x 8 = 56 pcs.</td>
</tr>
<tr>
<td>Mechanical Yield</td>
<td>&gt; 99.7%</td>
</tr>
<tr>
<td>Gross Throughput (6&quot;)</td>
<td>&gt; 2,400 w/h</td>
</tr>
<tr>
<td>Productive Time</td>
<td>90%</td>
</tr>
<tr>
<td>Net Throughput</td>
<td>&gt; 2,140 w/h</td>
</tr>
<tr>
<td>Yearly Capacity</td>
<td>≥ 110 MWp</td>
</tr>
<tr>
<td>Wafer Size</td>
<td>6” wafer (pseudo or full-quare)</td>
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<tr>
<td>Wafer Type</td>
<td>n-type mono</td>
</tr>
<tr>
<td>Length</td>
<td>22.6 m</td>
</tr>
<tr>
<td>Width</td>
<td>9.8 m</td>
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<tr>
<td>Height</td>
<td>3.0 m</td>
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</table>

Specifications:

- Process: PECVD process for a-Si:H
- Reactor: Parallel plate reactor with 13.56 MHz
- Pressure: Process pressure approx. 1 mbar, chamber pressure approx. 1E-3 mbar during process
- Temperature: Substrate temperature up to 220°C
Service

Meyer Burger, with its service centers near you, offers first-class service that only the original manufacturer can deliver. We take responsibility for the availability and productivity of your equipment today and tomorrow.

With a complete range of services, we support you from commissioning through production support and maintenance to life-prolonging system upgrades. All works are carried out by qualified technicians and with original service parts only – at your site or in our local service center.

Wherever you need it, our service is available in time, and of top quality.