VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometer and a few micrometers thin, depending on the application.

Our customers use these materials to make high-quality products such as architectural glass, displays for smartphones and touchscreens, solar modules and heat protection window film for automotive glass.

We supply our customers with technologically sophisticated vacuum coating systems, extensive expertise and global service. The key components are developed and manufactured by VON ARDENNE itself.

Systems and components made by VON ARDENNE make a valuable contribution to protecting the environment. They are vital for manufacturing products which help to use less energy or to generate energy from renewable resources.
FLASH LAMP ANNEALING

Tempering processes are often the means of choice in thin-film technology to improve electrical, optical or even mechanical properties. However, conventional tempering processes are time-consuming and energy-intensive. Furthermore, they cause thermo-mechanical stress within the substrate, which can lead to defects. They also require long heating processes.

In thin-film technology, these cause diffusion processes and make the use of additional barrier layers necessary. Because of all that, the manufacturing process is more complex and more expensive.

Flash lamp annealing, by contrast, offers crucial advantages: it causes no or only minor thermo-mechanical stress within the substrate and subdues diffusion processes. Therefore, there is no need for additional barrier layers.

The technology also saves up to 95 percent of energy compared to other tempering processes. Furthermore, this technology reduces the footprint of your production line and increases its productivity and cycle time.

RESEARCH & DEVELOPMENT

Modifying optical, electrical and mechanical properties for all kinds of materials

Flash lamp annealing is beneficial for various kinds of applications, modifying electrical, optical and mechanical properties. Depending on the technological requirements, the flash lamp annealing module can be provided as a stand-alone system or as a compartment of a cluster system.

Within a cluster system, it can be combined with various deposition and pre-treatment technologies. Flash lamp annealing for R&D enables a broad process window.

ITO AND OTHER TCOs

Improving optical and electrical properties of transparent conductive oxides (TCO) by enhancing crystallization

TCOs such as indium tin oxide (ITO) are cost-sensitive large-area coating materials for flat panel display applications. In order to meet high industry standards, they have to be deposited at high temperatures and thermally post-treated to meet conductivity and transmission requirements. That increases the equipment and processing costs substantially.

Flash lamp annealing, by contrast, offers a more cost-effective alternative, as it enables the "activation" of cold-deposited ITO to performance levels that even exceed the values of standard processes.

CONDUCTIVE INKS

Photonic sintering of conductive inks

Printed electronics require conductive inks. Their electrical resistance can be significantly improved by flash lamp annealing. Beyond that, it drives out solvents and increases cross-linking.

In order to reach the best electrical performance, flash lamp annealing is a unique post-annealing process that leverages electrical conductivity directly after thermal treatment. Furthermore, flash lamp annealing is ideally suited to be integrated into roll-to-roll processes to increase productivity.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Subject to change without notice due to technical improvement.</th>
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</thead>
<tbody>
<tr>
<td><strong>PROCESS RANGE</strong></td>
</tr>
<tr>
<td>Energy density: 0.5 J/cm² to 15 J/cm² optically</td>
</tr>
<tr>
<td>Pulse durations: 0.2 ms to 20 ms</td>
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<tr>
<td>Substrate sizes: from 1” wafers to 3.760 mm wide substrates</td>
</tr>
<tr>
<td>Substrate transport: Wafer handling in batch or cluster systems, S2S and R2R for industry solutions</td>
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<tr>
<td>Environment: Vacuum, atmosphere or process gas</td>
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