Small to Medium Volume Production System

Small-ELVESS

This system was developed for the small to medium volume production of OLED displays. Small-ELVESS supports everything from the development and prototyping of OLED displays to the small-volume production of color displays. All processes, from O2 plasma cleaning to deposition and encapsulation, can be performed in a single system. Substrates are automatically transported by robots that make it possible to fabricate high-performance OLED devices with a high degree of reproducibility. The Small-ELVESS system is ideal for prototyping panels, right up to the point of transition to mass production.

Try-ELVESS

This system is designed for developing organic materials, and for prototyping, researching, and developing OLED panels. The Try-ELVESS system is ideal for OLED research & development, as well as material development. It includes an O2 plasma cleaning chamber, an organic light-emitting diode layer deposition chamber, a metal cathode deposition chamber, an encapsulation chamber, and other components in a unified and compact system that makes it possible to prototype high-grade OLED devices without any contact with the air.

OLED Production Systems

System-ELVESS OLED Mass Production System

Small-ELVESS Small to Medium Volume Production System

Try-ELVESS Research & Development System
Unified processing that includes both deposition and encapsulation makes long, continuous, and stable operation possible

OLED Production Systems

System-ELVESS

OLED Mass Production System

Ever since the beginning of commercial production of OLEDs, Canon Tokki has consistently led in mass production system technology, based on its 30 years of experience in vacuum deposition equipment manufacturing and 35 years of experience in the design and development of factory automation systems. The ELVESS OLED Mass Production System brings together crucial and indispensable know-how in areas such as the deposition of fast-evolving organic materials and metallic materials, the high-precision mask alignment vital to full-color pixel fabrication, and the encapsulation processes that directly affect the reliability of OLED panels. This system will continue to evolve as OLED devices evolve.

System Features

- Stable deposition is realized through the use of our proprietary cell-type evaporation source and control of the vapor deposition rate.
- Improved operation efficiency is realized through the stacking of vapor deposition material, the automated supply of cathode metal material, and the automated cleaning of metal masks.
- Deposition demonstrates superior uniformity and reproducibility.
- Stable encapsulation is realized through the use of an automated encapsulation glass supply line and a fully automated encapsulation mechanism.
- High-precision alignment is realized through the use of a proprietary alignment mechanism and a control system using a CCD camera.
- A long span and stable, continuous device production have been realized by integrating the deposition and encapsulation processes.
- A versatile range of extensibility also allows for the support of large substrates.

Organic Thin Film Deposition

- Point Source Evaporation
- Parallel Shot Evaporation
- Resistive Heater Point Source
- Resistive Heater Parallel Shot Source
- Plasma Evaporation
- Film Uniformity
- Film Thickness Uniformity
- Film Stress over Time Period
- 1. Automatic Loading of Glass Substrate with ITO Anode
- 2. Substrate Pre-cleaning
- 3. Hole-Injection Layer Deposition
- 4. Hole-Transport Layer Deposition
- 5. Deposition-GREEN
- 6. Deposition-RED
- 7. Deposition-BLUE
- 8. Electron-Transport Layer Deposition
- 9. Electron-Injection Layer Deposition
- 10. Metal Cathode Layer Deposition
- 11. Encapsulation Glass provided with desiccant and adhesive is transported to the encapsulation chamber in N2 gas atmosphere maintained at a low humidity by controlling the dew point where they are pressed onto the glass substrates, followed by adhesive and encapsulation by UV irradiation.
- 12. Preheated glass substrates on which the encapsulation process has been completed are automatically unloaded to a storage stocker by the robot installed outside the cluster to complete the integrated continuous production process.

Basic Specifications of the Mass Production Systems

<table>
<thead>
<tr>
<th>Glass Substrates</th>
<th>25.0 x 43.0 mm to 1,200 x 2,000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITO patterned glass substrates (PM) / ITO patterned glass substrates (AM)</td>
<td></td>
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<tr>
<td>Exhaust</td>
<td>- Deposition process: 10”/sec.</td>
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<tr>
<td></td>
<td>- Evaporation process: Low vacuum close to atmospheric pressure, 5% gas atmosphere maintained at low humidity by control of the dew point</td>
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<tr>
<td>Deposition</td>
<td>- Organic material: Resisting heated point source, film thickness distribution ±10%</td>
</tr>
<tr>
<td></td>
<td>- Metal material: Pd or Pt evaporation source, film thickness distribution ±1.0%</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>- Deposition process: 10”/sec.</td>
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<td>- Evaporation process: Low vacuum close to atmospheric pressure, 5% gas atmosphere maintained at low humidity by control of the dew point</td>
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<td>- Metal material: Pd or Pt evaporation source, film thickness distribution ±1.0%</td>
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<tr>
<td>Control</td>
<td>- Automatic operation by controlling transport, exhaust, deposition, and encapsulation conditions based on computer and sequencer settings</td>
</tr>
<tr>
<td>Mean Alignment</td>
<td>- Positioning of glass substrates and metal masks is aligned to within ±50 μm with a CCD camera</td>
</tr>
</tbody>
</table>

When OLED displays are manufactured, deposition occurs in a vacuum to prevent the degradation of organic layers, and bonding and encapsulation must occur without any contact with the air. Key process atmosphere parameters are controlled in a unified fashion, and all processes are completely automated, resulting in stable production.