Thin Film Encapsulation for Scintillator Plates

Challenge

Scintillator materials such as Cesium Iodide (CsI) and Sodium Iodide (NaI) are extremely hygroscopic. Unfortunately moisture destroys the crystalline structure and then the functionality of the scintillator is lost. Scintillators have a high aspect-ratio and dense structure which is difficult to coat.

The coating for the scintillators needs to be:
- A high-performing moisture barrier
- Very thin
- Uniform and conformal

Solution

Beneq’s robust batch atomic layer deposition (ALD) process for multiple products. A conformal, dense and pinhole-free, low temperature AlOx and TiOx barrier coating has enabled dramatic increase of product lifetime and reliability (eg. 1000hrs in 85/85 testing) for scintillator plates.

Why Beneq?

- Beneq is the leading industrial ALD expert
- First industrial user of ALD
- Over 30 years of experience with ALD in production
- Over 40 in-house ALD tools
- Focus on high-capacity production ALD

Beneq offers

- Coating Services
- Beneq P400A and P800 ALD production systems

We enable ALD coating at either Beneq’s facilities or at the customer’s own site.

ALD Benefits

ALD offers you the following:
- An extremely low water vapour transmission rate (WVTR).

A comparison below:

<table>
<thead>
<tr>
<th>Material</th>
<th>Coating Thickness</th>
<th>WVTR (g/m²d)</th>
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</thead>
<tbody>
<tr>
<td>Parylene</td>
<td>1000nm</td>
<td>8 * 10⁻²</td>
</tr>
<tr>
<td>ALD Nanolaminate</td>
<td>20 nm</td>
<td>10⁻⁶</td>
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</tbody>
</table>

- Atomic-level control of the coating thickness
- Conformality: the film is equally thin all around the substrate’s geometry
- High density of the coating
Beneq® is a leading supplier of Atomic Layer Deposition equipment and thin film coating services, and the world’s premier manufacturer of thin film electroluminescent displays.

Thin Film Solutions

Beneq® thin film solutions improve the performance and durability of electronics, optics and sensitive materials, and protect from humidity, corrosion and tarnishing. The application areas range from OLED encapsulation, surface passivation of solar cells, moisture barriers of electronics and anti-tarnish treatment of jewelry to RFID tags, smart packaging, optical coatings and wafer-based semiconductor applications.

Thin Film Displays

Beneq’s Lumineq® displays, enabled by atomic layer deposition, are the most transparent displays in the world. Their exceptional aesthetics and first-class viewing experience offer unique differentiation possibilities for high-end products. In-glass laminated Lumineq displays add value to windows and improve the safety and ergonomics of vehicles. Rugged Lumineq displays tolerate extreme conditions better than any other display type.

Established: 2005
Personnel: 132
Turnover: 213 M€ (2017), 97% outside Finland. Europe was the biggest market in 2017 with a 40% share, followed by the Asia and Americas with 34% and 24% shares respectively. Rest of the world formed 2% of the revenues.

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