Printed Flexible OLED Displays

Key Technology Status:

- RGBW 400 cd/m² achievable at less than 5V operating voltage.
- Air-deposited active layers and air-stable cathode.
- Straightforward encapsulation process (lamination) with an off-the-shelf material, offering shelf life > 5 years.

Technology features

<table>
<thead>
<tr>
<th>Thin (&lt;0.3mm), lightweight and flexible</th>
<th>Single and multicolour emission</th>
<th>Distributed flat emission over large area</th>
<th>Low drive voltage and long lifetimes</th>
<th>Mechanical robustness</th>
<th>Low power requirements; mains and battery power possible</th>
</tr>
</thead>
</table>

Near Field Communication (NFC) powered OLED

6” Touch Sensitive HMI device – 300 µm thickness and fully flexible
Single, multicolour Ink Jet printed OLEDs

Multicolour filter overlay and graphic equalizer with 7-segment display
30ppi flexible passive matrix OLED

Application Space

Household Appliances, White Goods
- Thin, lightweight and flexible
- Distributed OLED icons over large area.
- No need for pick and place or diffusers.

Smart card, Promotional Signage, Security
- Direct integration into production.
- Wide array of designs possible

Consumer (Medical) Devices, Toys, Wearables
Flexible OLED performance table

<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Red</th>
<th>Blue</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminance turn-on</td>
<td>&lt; 20 msec</td>
<td>&lt; 20 msec</td>
<td>&lt; 20 msec</td>
<td>&lt; 20 msec</td>
</tr>
<tr>
<td>Max operating voltage</td>
<td>&lt; 5 V</td>
<td>~5 V</td>
<td>&lt; 5 V</td>
<td>&lt; 5 V</td>
</tr>
<tr>
<td>Luminance</td>
<td>400cd/m²</td>
<td>400cd/m²</td>
<td>400cd/m²</td>
<td>400cd/m²</td>
</tr>
<tr>
<td>Operating lifetime</td>
<td>&gt; 5,000 hrs</td>
<td>&gt; 5,000 hrs</td>
<td>&gt; 5,000 hrs</td>
<td>&gt; 5,000 hrs</td>
</tr>
<tr>
<td>Drive current density</td>
<td>~3 mA/cm²</td>
<td>~70 mA/cm²</td>
<td>~5 mA/cm²</td>
<td>~5 mA/cm²</td>
</tr>
<tr>
<td>Power requirement</td>
<td>&lt; 10 mW/cm²</td>
<td>&lt; 400 mW/cm²</td>
<td>&lt; 15 mW/cm²</td>
<td>&lt; 25 mW/cm²</td>
</tr>
<tr>
<td>Shelf life (under evaluation)</td>
<td>&gt; 5 years</td>
<td>&gt; 5 years</td>
<td>&gt; 5 years</td>
<td>&gt; 5 years</td>
</tr>
<tr>
<td>CIE colour</td>
<td>0.30, 0.64</td>
<td>0.68, 0.31</td>
<td>0.14, 0.17</td>
<td>0.35, 0.38</td>
</tr>
</tbody>
</table>

Working with CDT:
- CDT can design and fabricate prototypes to meet your application needs.
- Sampling of CDT’s Flexible OLEDs to trial in your product, application or processing.
- Full life-cycle testing facilities on-site.
- Technology transfer options available for manufacturing partners.
- To discuss working with CDT, please email: enquiry@cdtltd.co.uk

Simpler Manufacturing:
- Low cost tool set.
- Additive processing techniques.
- Fast takt time for all processes.
- Organic layers printed and dried in air.
- No low Wf metal required (air stable cathode)
- Reduced encapsulation requirements → simple lamination step.