Red Diamond™ 620iuv Inkjet Printable, Ultraviolet Curable OLED Fluid Product Data Sheet

Version 2

Organic light emitting diode (OLED) emissive layer that can be deposited by inkjet printing methodology. It can be inkjet onto poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate) (PEDOT:PSS). This fluid is designed for researching printable OLED purposes.

Benefits Of Inkjet Printable Fluids

1. Bespoke printing
2. Minimum wastage of material
3. Initial investigations into inkjet printable OLEDs
4. Interlace OLEDs with UV-inkjet colour inks
5. Part of other inkjet printable electronic components
6. Cross-linking initiated at 254nm ultraviolet light

How Inkjet Printable OLEDs Work

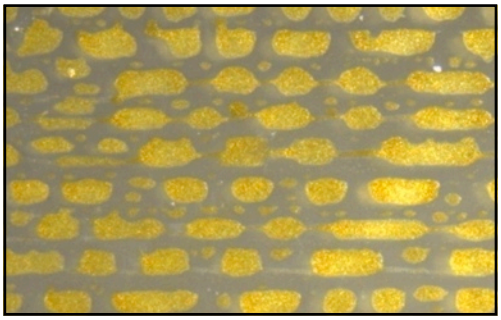
This fluid is the active portion for use in a multi-layer organic electronic device, wherein the active portion is sandwiched between the anode and cathode layers. The light emitting material in this fluid results in significantly improved uniformity of light dispersion from the device. The material structure is ina volatile solvent carrier, where the carrier evaporates post-deposition. Heating the print-bed is advised to aid removing the solvent component.

The thickness of the layer is determined by the substrate's surface and the printed droplet size. For 10pl drop size, layers for UV curable inks are approximately 8µm. The diameter of standard inkjet nozzles is 45µm.

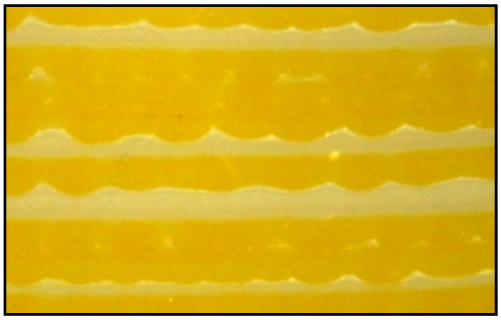
Parameter	Value
Surface energy	48mN/m @ ambient temperature
Viscosity	50-100mPA.s @ ambient 10-20mPA.s @ 55°C
Average particle size if not dissolved	< 15µm
Curing wavelength	254nm

Inkjet OLED Fluid Parameters

The particulate light emitting material is an ionic transition metal complex based on ruthenium. It is printed directly on the hole transport material, PEDOT:PSS. PEDOT:PSS offers better surface wetting properties than ITO. On ITO, the emissive 'beads' as it hits the substrate. This printing was achieved using a Dimatix inkjet test printer:



OLED emissive layer inkjet printed on ITO



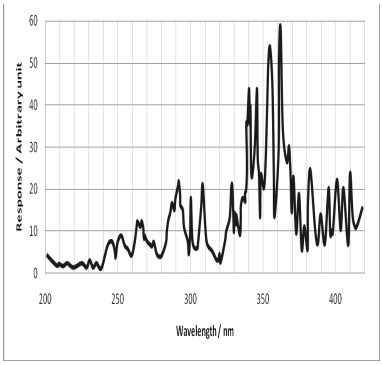
OLED emissive layer inkjet printed on PEDOT:PSS

Inkjet printing can result in breaks in the printed layers. When the cathode is deposited, then the device switched on, the short circuits will result in localized heating of the device. This can be solved by the use of a pulse width modulation electronic controller.

How Ultraviolet Curing Works

Ultraviolet (UV) curable fluids contain polymer molecules that link together when exposed to light of a wavelength that the polymer can absorb the energy of. The process is called cross-polymerization.

Ultraviolet light is be bandwidth 200 - 400nm of the electromagnetic spectrum. It is at the blue end of the visible spectrum. UV light is split into three groups, UV-A (200 - 280nm), UV-B (281 - 315nm) and UV-C (316 - 400nm). UV light from mercury-iron (Hg:Fe) have the greatest UV output at 224nm:



Mercury-Iron UV Arc Lamp Spectral Emission

UV curing is faster if conducted in an inert environment such as nitrogen gas. Excluding oxygen speeds the reaction for the reason that where there is oxygen, then cross-linking process is inhibited.

Note: Mercury-lead (Hg:Pb) has less energy at 254nm, but will enable cross-polymerization. Presently UV-LEDs do not have energy less than 370nm, so they cannot be used.

Polymertronics' Expertise

Polymertronics' products are designed to be out-of-the-box and simple to use. The product range is for businesses and educators who want to understand OLED technology and to develop products for market:

1. Flexible, rigid and inkjet printable OLED Science Kits for experimenting with OLEDs
2. Ultraviolet curing expertise and equipment for printable electronics
3. Electronic drivers for optimizing OLED performance
4. Solid state lighting development products and expertise
5. Full product development capability for applications
6. *Center-Point* for finding resources and answers to queries

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Note$_1$: Polymertronics reserves the right to amend this product's specification and/or look of the product without updating this data sheet.
Note$_2$: Polymertronics is a subsidiary of E²M Technology Limited, United Kingdom.