

Hybrid OLED's cost and yield cannot easily catch up to rigid OLED's

This is due to idling equipment, unfamiliar product sizes, and production line adjustments.

Publication Date: May 21, 2020

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Key findings

- By skipping a few processes, flexible organic light-emitting diode (OLED) display makers could supply competitive mobile/PC hybrid OLED displays versus rigid OLEDs.
- Hybrid OLED's advantage is being thinner and lighter than rigid OLEDs on top of having a potentially lower cost than flexible OLEDs.
- However, hybrid OLED's cost and yield cannot easily catch up to rigid OLED's.

IT brands have been interested in OLED recently. Samsung Display is dominating rigid OLEDs for the IT industry, and its competitors do not have suitable rigid OLED capacities for IT applications. However, by skipping and modifying some steps of the fabrication process, flexible OLED display makers could supply a new type of OLED display to the IT market.

Table 1: The three types of OLEDs' distinguishing characteristics

	Rigid AMOLED: Glass substrate + glass encapsulation	Flexible AMOLED: PI substrate + TFE	Hybrid AMOLED: Glass substrate + TFE
Glass input	O	O	O
PI coating	X	O	X
Lithography processes	O	O	O
Evaporation	O	O	O
Encapsulation	Glass	TFE	TFE
LLO	X	O	X
Cutting	Wheel cutting	Laser cutting	Wheel cutting
Lamination, bonding, etc.	O	O	O
Thickness (estimated)	0.7mm	0.2mm	0.4mm
Structure illustration			

Source: Omdia

This new type of OLED display has glass substrates, like rigid OLED, and thin-film encapsulation (TFE), like flexible OLED, so Omdia named it "hybrid OLED". The distinguishing characteristics of the three types of OLED are listed in **Table 1**.

Compared with rigid OLED, hybrid OLED is thinner and lighter, which is good for IT brands. Hybrid OLED is also said to be cheaper than flexible OLED because steps such as polyimide (PI) coating and laser lift-off (LLO) are skipped when making hybrid OLEDs.

However, hybrid OLED's cost and yield cannot easily catch up to rigid OLED's because of the following:

- Hybrid OLED displays are planned to run at flexible OLED lines, which means the equipment for the skipped steps remain. Hence, these depreciated costs are still counted in the whole plant running cost.
- Bypassing PI coating and LLO will improve the yield. However, the supplier's primary obstacle is still increasing the yield to mass production levels because IT displays' diagonal sizes are usually larger than the average smartphone product.
- On top of that, suppliers must also equip wheel cutting machines to produce hybrid OLEDs. This is unnecessary in a common flexible OLED line.

Appendix

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