Docket #: S11-192

Microfluidic Arrays for Rapid Characterization of Organic Thin Film Transistor Performance

Stanford University and Samsung researchers have patented a microfluidic-based platform that can rapidly fabricate and characterize Organic Thin Film Transistor (OTFT) arrays composed of solution-processable organic semiconducting polymers. Microfluidics offers numerous advantages for this high-throughput screening of OTFTs including the ability to:

1) rapidly handle and interface multiple solutions;
2) pattern solutes on substrates with micrometer-scale precision; and
3) reduce the scale of experimentation.

This method has been successfully tested to screen the performance of OTFT devices fabricated from PQTBTz-C12, a solution processable organic semi-conducting polymer, to extract empirical processing-property relationships and identify the optimal combination of solvent composition and substrate annealing temperature.

Stage of Development:
Proof-of-concept – Successfully applied platform to screen performance of OTFT devices fabricated from PQTBTz-C12 to extract empirical processing-property relationships and identify the optimal combination of solvent composition and substrate annealing temperature.

Applications

- Organic Thin Film Transistors (OTFTs) for light-emitting diodes (LED), radiofrequency devices, digital displays, photovoltaics, and sensors.
- Automated, fast screening technology for life sciences.

Advantages

- Precise microfluidic-based platform reduces scale of experimentation.
- Rapid fabrication and characterization.
- More uniform processing for more consistent, high-performance devices.

Publications

- Christopher J. Bettinger, Hector A. Becerril, Do Hwan Kim, Bang-Lin Lee, Sangyoon Lee, and Zhenan Bao, "Microfluidic Arrays for Rapid Characterization of Organic Thin-Film Transistor Performance," Advanced Materials, Vol. 23, Issue 10, March 11, 2011 (published online Jan. 10, 2011).
- Chung, J. W., Bettinger, C. J., Bao, Z., Kim, D. H., Lee, B. L., Park, J. I., ... & Lee, S. Y. (2014). U.S. Patent No. 8,679,984. Washington, DC: U.S. Patent and Trademark Office.

Patents

- Published Application: 20130001554
- Issued: 8,679,984 (USA)

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