

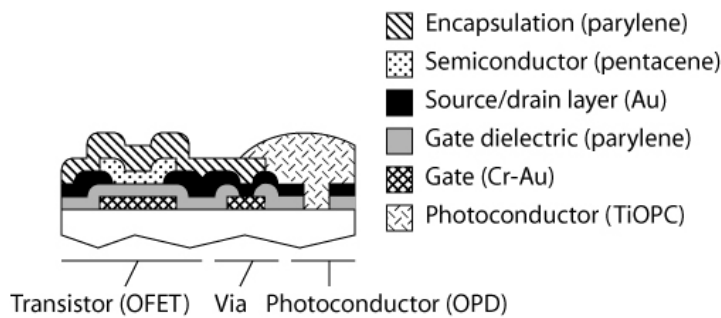
# Integrated Organic Circuits and Technology for Large Area Optoelectronic Applications

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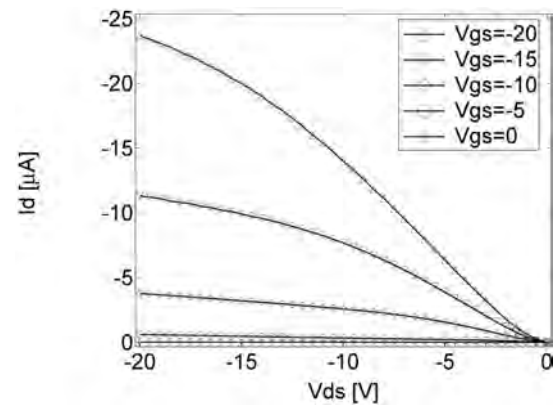
Organic semiconductors can be deposited at near-room temperatures, enabling the creation of electronic and optoelectronic devices on virtually any substrate. This unique technology makes possible the fabrication of large-area, mechanically flexible optoelectronics, such as conformable displays or image sensors. To realize these systems, an integrated approach to fabrication of organic optoelectronics is necessary.

A near-room temperature ( $<95^{\circ}\text{C}$ ), scalable process has been developed, using conventional photolithography and inkjet printing [1]. This process produces integrated organic field effect transistors (OFETs) and organic photoconductors (OPDs) on a single substrate. A cross section of the finished substrate is shown in Figure 1.

Typical device characteristics for an integrated OFET are shown in Figure 2. As a proof of concept, a 4x4 active-matrix imager was created using the process and was demonstrated to correctly image patterns [2].



▲ Figure 1: Schematic cross section of finished substrate illustrating OFET, OPD, and two interconnect layers.



▲ Figure 2: Typical output characteristics for a 1000 $\mu\text{m}$  / 4 $\mu\text{m}$  OFET.

## REFERENCES

- [1] I. Kymissis, C.G. Sodini, A.I. Akinwande, and V. Bulović, "An organic semiconductor process for photodetecting applications," *International Electron Device Meeting*, Dec. 2004, pp.15.4.1-15.4.4.
- [2] I. Nausieda, K. Ryu, I. Kymissis, A.I. Akinwande, V. Bulović, and C.G. Sodini, "An organic imager for flexible large area electronics," *IEEE International Solid State Circuits Conference Digest*, Feb. 2007, pp.72-73.