Large Area Electronics with Organic FETs

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Large area electronics is a new frontier in electronics where intelligent electronic devices are distributed on a flexible square, 10 cm to 10 m on a side, for the human interface and the comfortable daily life. Flexible and low-cost organic FETs (OFETs) are suitable for large-area electronics and have great potential as a supplement of solid and expensive silicon MOSFETs. Compared with the silicon MOSFETs, however, the operation speed of OFETs is slow (μs ~ ms) and the device lifetime of OFETs is short (days ~ months), because fabrication technologies for OFETs are not yet mature.

We have developed circuits technologies to help the slow and unreliable OFETs and demonstrated three large-area applications, (1) an artificial skin for robots where pressure sensors and OFETs are integrated, (2) a sheet-type scanner where photodetectors and OFETs are integrated, and (3) a Braille sheet display where plastic actuators and OFETs are integrated. Device and circuit technologies for these large-area applications will be shown.

Keyword:
Organic FETs: Field effect transistors (FETs) made with organic materials such as pentacene ($C_{22}H_{14}$). An FET is a switch device used in integrated circuits.