

Fabrication of Direct-Printed OTFT Array Using Flexible h-PDMS Stamp

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(Received May 8, 2007; accepted September 7, 2007)

Key words: microcontact printing, direct printing, organic thin-film transistor, printed OTFT,
h-PDMS stamp

Printed organic thin-film transistors (OTFTs) for use as a switching device in an organic light-emitting diode (OLED) were fabricated by microcontact and direct printing at room temperature. The printed OTFT was used in the fabrication of a printed gate with source and drain electrodes ($W/L = 500 \mu\text{m}/5 \mu\text{m}$, $500 \mu\text{m}/10 \mu\text{m}$, and $500 \mu\text{m}/20 \mu\text{m}$) printed using a hard poly (dimethylsiloxane) (h-PDMS) stamp and low-viscosity Ag ink, a spin coated parylene-C gate dielectric, and a soluble poly (3-hexylthiophene-2,5-dily) (P3HT) organic semiconductor on flexible, transparent poly(ethylenenaphthalate) (PEN) plastic substrates. The printed OTFT was characterized and the following parameters were obtained: a mobility of $0.06 (\pm 0.02) \text{ cm}^2/\text{Vs}$, an on/off current ratio of 10^3 , and a subthreshold slope of 2.53 V/decade . Also, it was possible to fabricate a printed OTFT with channel lengths down to $5 \mu\text{m}$, and reduce the fabrication process by 20 steps compared with photolithography.

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