Fabrication of Au/PEDOT/PSS Stacked Electrodes of OTFTs by Imprinting Technology

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Abstract

The organic thin film transistors (OTFTs) have become the potential candidates for low-cost and flexible electronics application. The imprint techniques had been demonstrated to fabricate the micro- and nano-scale metal pattern for OTFTs [1-3]. In this work, the metal/polymer stacked source/drain electrodes of OTFTs were fabricated by combining the micro-contact inking and reversal imprinting. The PEDOT/PSS polymer was inked with the Au coated mold. Then, the Au/PEDOT/PSS stacked electrodes of OTFTs were reversal imprinted onto the pentacene. The channel length of OTFTs was scaled down to ~3µm. And the source/drain contact resistance of organic TFTs was improved by the proposed process.

In our experiment, the PEDEOT/PSS was spin-on coated on Si wafer and baked for 2 minutes. Then, as shown in Fig. 1, the Au coated mold was placed naturally on the PEDOT/PSS coating surface for 1 minute and inked with the PEDOT/PSS. Fig.2 shows the fabrication of OTFTs. The electrode was fabricated on the pentacene with the imprinting condition of 90-120 oC, 100-300 psi, for 3min. The OTFTs channel width/length is about ~150-750µm/~3-75µm. The electrical characteristics of OTFTs were measured by HP 4156. The contact resistance was extracted using the transmission line method (TLM).

Fig. 3(a)-(b) show the photography and microscope (OM) image of Au/PEDOT/PSS stacked electrode imprinted on flexible polyimide substrate. The electrodes were transferred effectively. The yield of transferring of electrodes on the pentacene substrate is also about ~90%.

In conclusions, the above results suggest that the proposed technique is suitable for the future low-cost and flexible electronics applications.

References