

Preparation and characteristics of solution-processable organic thin film transistors on a PES substrate

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In recent years, flexible-formed organic thin-film transistors (OTFTs) have been intensely investigated due to their low cost and lightweight for potential use in applications such as flexible displays and low-cost flexible integrated circuits (ICs).[1,2] Polymer OTFTs with poly-4-vinylphenol(PVP) gate dielectrics were integrated onto flexible polyethersulfone (PES) substrates by spin-coating and inkjet printing methods. The active materials used were poly(9,9-dioctylfluorene-co-bithiophene) (F8T2) and poly(3-hexylthiophene) (P3HT) polymers, which were functionalized with biotin hydrazide. The relationship between the chemoresistive change and the binding of avidin-biotin moieties in the polymers was observed in the output and on/off characteristics of OTFTs. The exposure of OTFTs to avidin caused a lowering of the I_D at $V_D = -40$ V, $V_G = -40$ V of nearly five orders of magnitude, and the results were very applicable to a biosensor.

References:

- [1] F. Mouffouk, S. J. Brown, A. M. Demetriou, S. J. Higgins, R. J. Nichols, R. M. G. Rajapakse, and S. Reeman, *J. Mater. Chem.*, **15** (2005) 1186.
- [2] W. Liang, Y. Huang, Y. Xu, R. K. Lee, and A. Yariv, *Appl. Phys. Lett.*, **86** (2005) 151122.

Figures:

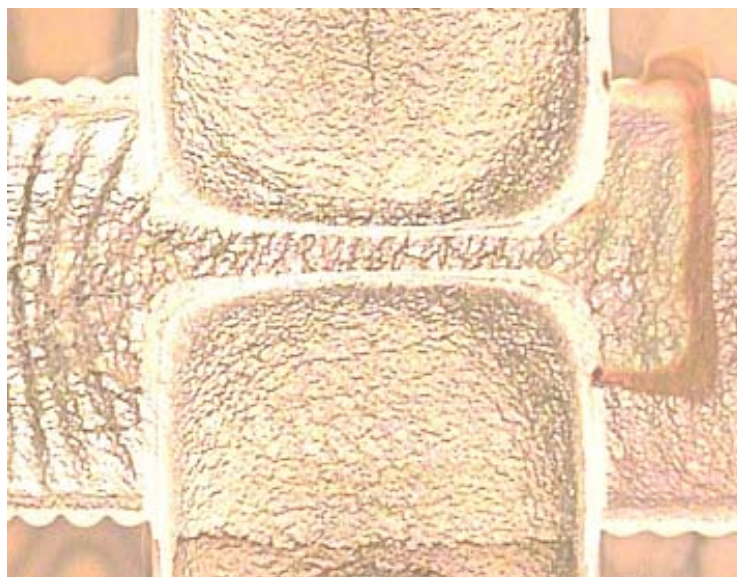


FIG. 1. Photograph of a solution-processable organic thin film transistor on PES by a inkjet printing.

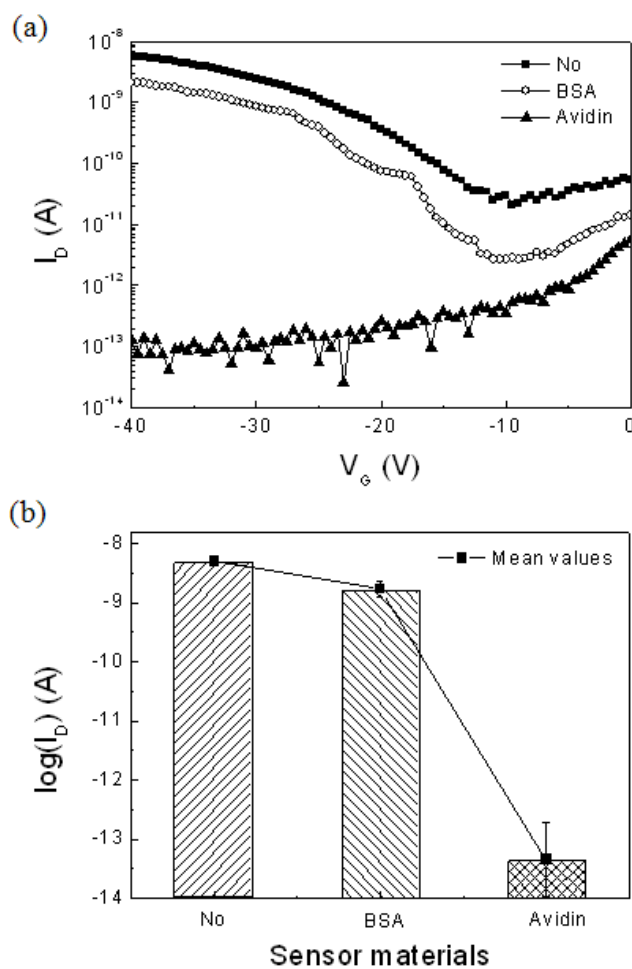


FIG. 2. (a) I_D - V_G characteristics of biotinylated F8T2 TFTs before and after exposure the antigen containing solutions. (b) Mean value and error bar of the I_D results at $V_D = -40$ V, $V_G = -40$ V obtained from ten independent measurements.