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Detecting properties of Biosensors based on biotinylated F8T2 semiconductor field-effect transistors

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Recently, there has been much interest in OTFT new biological, chemical, and environmental applications. Organic thin film transistors (OTFTs) are currently attracting considerable attention for their potential use in flexible low-cost electronic circuits. OTFTs have many unique advantages, such as light weight, flexibility, low cost of fabrication, and solution processability. One example of such device is a biologically sensitive field-effect-transistor (BioFET) to detect specific protein. We present the effects of electrochemical and chemoresistive changes on the electrical performance of organic thin-film transistors (OTFTs). Source and drain electrodes were fabricated by means of lift-off process. OTFT devices were fabricated in the bottom contact geometry. The source and drain electrodes, which consisted of a 10 nm thick Cr layer and a 90 nm thick Au layer were deposited by using ebeam evaporator apparatus. Source-drain width and length are 100 ㎛ and 10 ㎛, respectively.

0.8 wt % of biotinylated F8T2 (poly(9,9-dioctylfluorene-co-bithiophene)) in p-xylene solvent were spin coated for a channel layer of OTFTs, and it has functional group with biotin hydrazide.binding of avidin (from egg white) to the biotin moieties caused drastic changes to photoluminescence of the polymer in solution, and to the electrochemistry and conductivity of the polymer in thin films. We have demonstrated a bio-organic-FET, or BioFET, in which the current was modulated over three orders of magnitude from the 2-terminal resistor (I-V) measured.