

The Study of Flexible Polymer TFT with Soluble DPP-based Organic Semiconductor for Ammonia Gas Sensor

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We fabricated the flexible polymer TFT on plastic substrate for gas sensor. The BG/TC P-29-DPP-SVS OFETs on a PEN substrate was used as flexible ammonia (NH₃) gas sensors. As the concentration of NH₃ increased, the channel resistance of P-29-DPP-SVS OFETs increased approximately 100 times from $\sim 10^7$ to $\sim 10^9 \Omega$ at $V_{DS} = -5$ V and $V_{GS} = -5$ V. Also, the electrical characteristics of P-29-DPP-SVS (p-channel) and P(NDI2OD-T2) (n-channel) OFET sensors were measured in the air and in ambient NH₃. The n-channel OFETs with P(NDI2OD-T2) showed an opposite trend compared with n-channel OFETs with P-29-DPP-SVS. Most conjugated polymers are doped/undoped by redox reactions in which their doping level can be altered by transferring electrons to or from the analytes. NH₃ is known as an electron-donor for conjugated polymers. Therefore, p-channel OFETs showed increased channel resistance upon exposure to NH₃ gas, whereas n-channel OFETs showed the opposite trend.

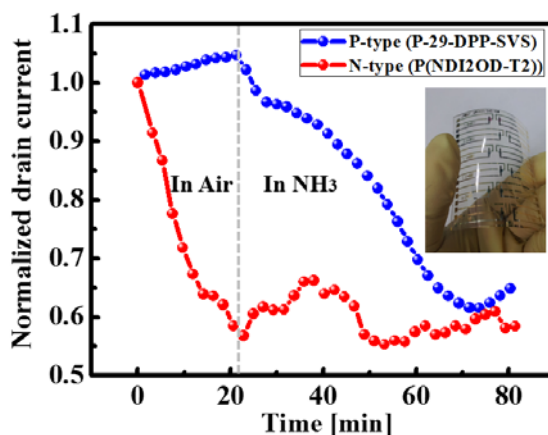


Fig. 1. Drain current trend of p-type and n-type OFETs according to ambient

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