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CHARACTERISTICS OF ORGANIC THIN FILM TRANSISTOR USING 4-ARMED 4(HPBT)-benzene

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Photoinduced characteristics of organic thin film transistor (OTFT) device using poly(alkylthiophene) as an active layer was reported by Narayan et al. [1] We fabricated OTFT device using a soluble star-shaped molecule, 4(HPBT)-benzene, and investigated photoinduced characteristics of the device. The core part of 4(HPBT)-benzene exhibit 2-dimensional planar geometry. Highly doped *p*-type Si wafer and thermally grown SiO₂ layer were used as a gate electrode and dielectric layer, respectively. Using conventional photolithography, gold (Au) source and drain electrodes were patterned with the length and width on the active region as 5 μm and 1500 μm, respectively. The active layer using π-conjugated 4(HPBT)-benzene molecules, dissolved in monochlorobenzene solvent was spin-coated at 1500~2000 rpm and then annealed at 160°C for 30 min. The schematic diagram of the OTFT device fabricated in this study is shown in Fig. 1. The OTFT device using 4(HPBT)-benzene as an active layer showed sensitive photoinduced characteristics. We observed the shift of threshold voltage and saturation current in photoinduced field-effect transistor characteristic curves. Through the measurements of the photoinduced saturation current as a function of drain voltages, we estimated photoinduced charge density of the OTFT.

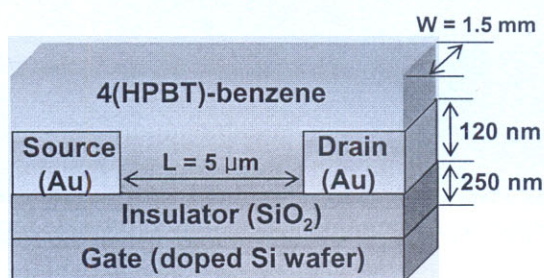


Figure 1. Schematic diagram of 4(HPBT)-benzene-based OTFT device.

References

1. K. S. Narayan, N. Kumar, Appl. Phys. Lett. **79**, 1891 (2001).