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Characteristics of Organic Thin Film Transistor Using π-Conjugated Dendrimers

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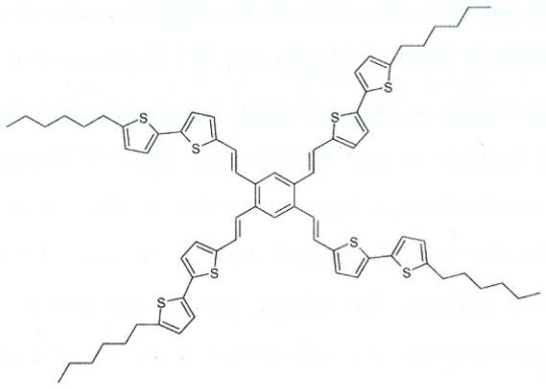
We fabricated organic thin film transistors (OTFTs) based on soluble π-conjugated dendrimers[1] such as 4(HPBT)-benzene, and investigated electrical characteristics of the devices. The active layer using planar π-conjugated dendrimers was spin-coated. Highly doped silicon and thermally grown silicon dioxide layer was used as a gate electrode and dielectric layer, respectively. Using conventional lithography, gold source and drain electrodes were patterned with the length and width of the active region as 5 μm and 1500 μm. Through the measurement of source-drain current (I_{ds}) with varying gate voltage, we obtained charge carrier mobility, on/off ratio, and threshold voltage. The OTFT devices using 4(HPBT)-benzene as the active layer showed a carrier mobility as high as 6×10^{-3} cm/Vs. We also measured temperature-dependent mobility and activation energy by using Arrhenius fitting.[2] Trap densities were investigated using the activation energy, and compared characteristics of various OTFT devices.



Chemical structure of 4(HPBT)-benzene

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