

Flexible a-IGZO thin film transistor using poly(p-xylylene) polymer as gate dielectric

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In thin film transistor(TFT) gate dielectric commonly used oxide dielectric such as SiO_x and SiN_x. But oxide dielectric has limits, high-temperature process and brittle property, to use as dielectric in low-cost flexible TFT. In this study, we apply CVD-deposited poly(p-xylylene) (parylene) as gate dielectric in top-gated-top-contact TFTs. Three type of commercialized parylene (parylene-C, D, AF4) and one synthesis parylene, ethynyl functionalized parylene (parylene-ethynyl), perfectly replace one of oxide dielectric, SiO₂. The dielectric constants of commercialized parylene are 2.94 (parylene-C, 110 nm), 2.60(parylene-D, 50 nm), 2.95(parylene-AF4, 100 nm), 3.41 (parylene-ethynyl, 74 nm). Also in a-IGZO TFT, TFT performance exhibit similar or partially superior to those of a-IGZO TFTs fabricated with SiO₂ gate dielectric. The best thing about parylene gate dielectric is the flexible TFT device. TFT fabricated on PI substrate can maintain electrical properties over 10,000 bending cycles. In addition, functionalized parylene, parylene-ethynyl, has excellent potential for modulating dielectric to diverse field.