

Highly Crystalline Polymers for High Performance Organic Transistors

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The electrical properties of organic thin film transistors (OTFTs) based on donor-acceptor type polymers will be presented. The polymers are composed of electron-rich donors and electron-deficient acceptors with branched alkyl chains. In the transistor performance test, we observed high charge transport behavior from these polymer films and thermal annealing of polymer films effectively increased carrier mobilities. To reveal the origins of mobility dependence on the chemical structure and thermal annealing, polymer films were fully characterized by GIXD, AFM, and TEM. The high-performance polymers showed high crystalline features with edge-on orientation. Thermal annealing up to 150 oC improved polymer film crystallinity and developed longer range lamellar structure simultaneously. These features directly explained charge transport behavior. In conclusion, we will present how polymer structures make a significant impact on film crystallinity and carrier mobility.