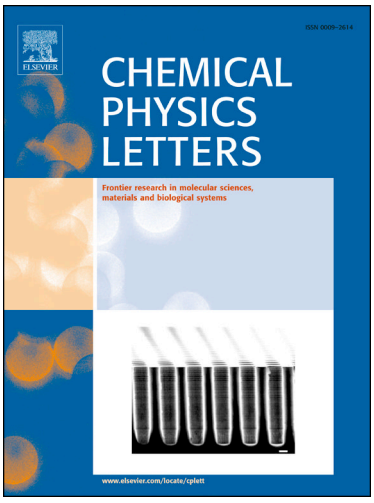

Research paper

Dihedral Angle Control to Improve the Charge Transport Properties of Conjugated Polymers in Organic Field Effect Transistors[a]

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Dihedral Angle Control to Improve the Charge Transport Properties of Conjugated Polymers in Organic Field Effect Transistors[a]

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ABSTRACT

Diketopyrrolopyrrole **(DPP)** and *i*-Indigo **(i-Ind)** are two monomers that are widely explored as active materials in organic field effect transistor and solar cells. These two molecules showed impressive charge carrier mobility due to better packing that are facilitated by quadrupoles. We hypothesized that the copolymers of these monomers would also exhibit high charge carrier mobility. However, we envisioned that the dihedral angle at the connecting point between the monomers will play a crucial role in packing as well as charge transport. To understand the impact of dihedral angle on charge transport, we synthesized three copolymers, wherein the DPP was sandwiched between benzenes, thiophenes and furans. The copolymer of *i*-Indigo and furan comprising DPP showed a band gap of 1.4 eV with a very high dihedral angle of 179°. The polymer was found to pack better and the coherence length was found to be 112 Å. The hole carrier mobility of these polymer was found to be highest among the synthesized polymer i.e. 0.01 cm^2/Vs. The copolymer comprising benzene did not transport hole and electrons. The dihedral angle at the connecting point between *i*-Indigo and benzene DPP was 143 Å , which the packing and consequently charge transport properties.

Keywords: OFET, *i*-Indigo, Diketopyrrolopyrrole, Charge Carrier Mobility