

Efficient doping of diketopyrrolopyrrole-based conjugated polymer with longer thiophene groups toward enhanced thermoelectric performance

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Backbone engineering of conjugated polymers for efficient doping can offer the possibility of advancing charge transport and thermoelectric performances. In this work, a diketopyrrolopyrrole (DPP)-based conjugated polymer with long thiophene groups in a repeating unit, EHT6-20DPP, was synthesized for achieving enhanced thermoelectric properties. The electrical conductivity and thermoelectric properties of the p-type doped EHT6-20DPP were achieved to be 93.28 S/cm and 56.73 $\mu\text{W}/\text{mK}^2$, respectively. Since the extended thiophene groups can act as electron donating groups, EHT6-20DPP showed better thermoelectric performance than the reference DPP-based polymer with shorten thiophene groups upon p-type doping. The experimental results of EHT6-20DPP were well fitted with a charge transport model which demonstrates the relationship between thermoelectric properties, indicating superior charge transport ability of the doped EHT6-20DPP via polymer backbone engineering.