

Searching Effective Polymer-Dopant composite for High Performance Organic Thermoelectric devices via One-Step Solution Mixing Process

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One-step doping of conjugated polymers by solution mixing is typically performed instead of sequential doping because of its simplicity. However, doped polymer solutions often exhibit poor solubility, and the dopants present in the produced films can disturb the molecular ordering of polymer structures. Here, we present strategies for two different cases of polymer-dopant pairs for enhancing thermoelectric properties via simple solution mixing. At first, a pair of two donor-acceptor (D-A) type polymers and a molecular dopant will be discussed. The D-A polymers could be effectively doped owing to their long side chains and shallow HOMO levels and their films exhibited outstanding power factors up to $31.5 \mu\text{W}/\text{mK}^2$. In the second part, the effects of fabrication conditions on doping characteristics will be presented for a well-known conjugated polymer, poly(3-hexylthiophene) (P3HT). The P3HT films doped by a Brønsted acid exhibited remarkably increased power factors up to $28.3 \mu\text{W}/\text{mK}^2$.