Doping of donor-acceptor polymers with long side chain *via* solution mixing for organic thermoelectric materials

서의현, 정용진, 오종규, 정재민, 이규민, 장재영†
한양대학교

Molecular doping is one of the most important processes to control optical and electrical properties of conjugated polymers for use in optoelectronic and thermoelectric devices. Although solution mixing is more attractive than sequential doping, doped polymer solutions often lose their solubility upon doping and the dopants present in the doped films can perturb the molecular ordering of the polymers, which hinder the fabrication of high performance organic thermoelectric materials. Here, we report on effective polymer/dopant pairs of two donor-acceptor type polymers (D-A polymers) and a molecular dopant. Their shallow HOMO levels allowed efficient charge transfer with the dopant. In addition, their long alkyl chains enabled to preserve both the solubility in the solution state and the crystallinity in the thin-film state upon doping. Moreover, the planar backbones of the D-A polymers facilitated charge transport, resulting in a maximum power factor of 31.5 $\mu W/mK^2$.