

Donor-Acceptor Type Polymer-CNT Composites for High Performance Organic Thermoelectric Devices and Generators

정재민, 정용진, 서의현, 양한솔, 이택성, 장재영[†]
한양대학교
(jyjang15@hanyang.ac.kr[†])

Organic thermoelectric (TE) devices have great attention as sustainable energy sources for next-generation electronics. Recent advances in TE materials based on polymers and carbon nanotubes (CNTs) have promised high TE properties. However, the TE performances of polymer-CNT composites still need to be improved to chase their inorganic counterparts. Herein, we introduce a novel type of polymer-CNT composites consisting of donor-acceptor (D-A) type polymers and few-walled CNTs (FWCNT). These D-A polymer-FWCNT composites exhibited superior electrical conductivities and power factors, about 2 times larger than those of the composites using poly(3-hexylthiophene). We investigated the effects of the CNT bundle size on the TE performance and found that the DA polymers showed strong interactions with FWCNTs due to their high backbone planarity. Finally, we fabricated flexible p-type TE generators by spray-coating, exhibiting maximum power output of 0.12 μ W under temperature gradient of 15 K.