Abstract Submitted
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Thermoelectric Properties of Carbon nanohybrids Incorporated Polymer Nanocomposites[1] KUN ZHANG, SHIREN WANG, Texas Tech University — In this work, non-covalently functionalized graphene with fluorinated fullerene (F-C_{60}) by π-π stacking was integrated into poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) (PEDOT:PSS). F-C_{60} as a *p*-type organic semiconductor with deep highest occupied molecular orbital (HOMO) level modulates the band structure of reduced graphene oxide (rGO). Altering HOMO levels of rGO has been achieved by changing the ratio between rGO and F-C_{60}. Incorporating of rGO/F-C_{60} nanohybrids into highly conductivity metallic PEDOT:PSS formed Schottky barrier to selectively scatter low-energy carriers. Enhanced thermoelectric power factor of rGO/F-C_{60}/PEDOT:PSS nanocomposites were observed with the optimized power factor of 83.2 μW/m.K^2, which is 19 times of that of the highly conductive PEDOT:PSS. Additionally, the F-C_{60} nanoparticles on rGO surfaces hinder thermal transport by phonon scattering, resulting in the synergistic effect on enhancing thermoelectric properties. As a result, a figure of merit (ZT) of 0.10 was achieved.

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