

Direct Synthesis of PEDOT:PSS/Graphene In-Situ Composites for Energy Harvesting Fields

_____, _____, _____¹, _____^{*}
 _____; _____¹
 (jayhkim@yonsei.ac.kr^{*})

The authors report for the conductive PEDOT:PSS/graphene composites with in situ polymerization and their applications in a thermoelectric device and a platinum (Pt)-free dye-sensitized solar cell (DSSC) as energy harvesting systems. Graphene (redu was dispersed in a solution of PSS and polymerization was carried out by the loading of a EDOT monomer to the dispersion. The weight -content of the graphene was varied and optimized for the highest electrical conductivity and seebeck coefficient. The composite solution was willing to utilize without any reduction process due to use the reduced graphene oxide (RGO). The fabricated film had a conductivity of 637 S cm^{-1} with an enhancement of 41 % by the introduction of 3 wt.% graphene contents. The conductive composite films were applied to an organic thermoelectric device, and the device showed a power factor of $45.7 \mu\text{W m}^{-1}\text{K}^{-2}$ which is 93 % higher than that of pristine PEDOT:PSS. In addition, thier composites were used for Pt-free DSSC showing an energy conversion efficiency of 5.4 %, which is 21 % higher than that of a DSSC with pristine PEDOT:PSS.