

## Thiazolo[5,4-D]Thiazole-Core Organic Chromophore with Furan Spacer for Organic Solar Cells

**Authors :** M. Nazim, S. Ameen, H. K. Seo, H. S. Shin

**Abstract :** Energy is the basis of life and strong attention has been growing for the cost-effective energy production. Recently, solution-processed small molecule organic solar cells (SMOSCs) have grown much attention due to the wages such as well-defined molecular structures, definite molecular weight, easy synthesis and easy purification techniques. In particular, the size of donor (D) and acceptor (A) unit is a crucial factor for the exciton-diffusion towards D-A interface and then charge-separation for the effective charge-transport to the electrodes. Furan-bridged materials are more electron-rich, high fluorescence, with better molecular-packing, and greater rigidity and greater solubility than their thiophene-counterparts. In this work, a furan-bridged thiazolo[5,4-d]thiazole based organic small molecule (RFTzR) was formulated and applied for BHJ organic solar cells (OSCs). The introduction of furan spacer with two terminal alkyl units improved its absorption and solubility in the common organic solvents, significantly. RFTzR exhibited a HOMO and LUMO energy levels of -5.36 eV and -3.14 eV, respectively. The fabricated solar cell devices of RFTzR (donor) with PC60BM (acceptor) as photoactive materials showed high performance of 2.72% (RFTzR:PC60BM, 2:1, w/w) ratio with open-circuit voltage of 0.756 V and high photocurrent density of 10.13 mA/cm<sup>2</sup>.

**Keywords :** chromophore, organic solar cells, photoactive materials, small molecule

**Conference Title :** ICNME 2018 : International Conference on Nano and Materials Engineering

**Conference Location :** San Francisco, United States

**Conference Dates :** June 06-07, 2018