New Conjugated Polymers based on BTI Derivatives for High Performance Solution-Processable Polymer Solar Cells

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Polymer solar cells using p-type (donor) and n-type (acceptor) semiconductors have attracted tremendous scientific and industrial interest. The most crucial challenge at molecular level is to develop p-type conjugated polymers that can simultaneously possess sufficient solubility for processability and miscibility with an n-type material, low band gap for strong and broad absorption spectrum to capture solar photons, and high hole mobility for efficient charge transport.

Polymers have been widely used to BHJ OSCs and achieved impressive progress of power conversion efficiencies (PCEs) over 8%, the interest in solution-processable small molecular p-conjugated organic donors has been accelerating for BHJ photovoltaic applications in recent years, owing to the advantages of definite structure, facile purification, high purity and good photovoltaic performance reproduction.

Soluble small organic molecules, HS-5466 and HS-5467 unit as new donor, were synthesized through Stille coupling reaction with $Pd_2(dba)_3$. They have good solubility in common organic solvents, such as tetrahydrofuran (THF), chloroform, toluene and ODCB.

The solid films of HS-5466 and HS-5467 show absorption bands with maximum peaks at about 368 nm, 495 nm and 397 nm, 517 nm. The HOMO and LUMO levels of the HS-5466 and HS-5467 were exhibited at -5.28 eV, -3.72 eV and -5.18 eV, -3.53 eV, respectively.

References

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