Designing Nonfullerene Organic Acceptor for High Efficiency and Versatile Processing

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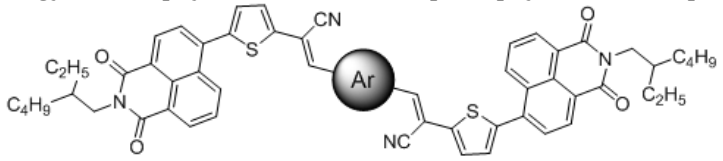
Nonfullerene acceptors have been attracting much interest in recent years, and there have been a number of reports on fullerene-free bulk heterojunction organic solar cells, exhibiting PCEs of over 8%. Here, we will discuss on novel dicyanodistyrylbenzene-based nonfullerene acceptors containing naphthalimide moiety (DCS-NI) and its derivatives. DCS-NI units show outstanding electron accepting and transporting properties with a balanced self-assembly behavior that suppress undesirable aggregation in film state. With these properties, DCS-NI acceptors show surprisingly high PCE of 2.7% with a P3HT donor[1] and 5.4% with a high performance small molecule donor *p*-DTS(FBTTh$_2$)$_2$[2] and 7.6% with high performance semi-crystalline polymer donor PPDT2FBT[3]. And, for the broad application in nonfullerene organic solar cells, naphthalene[4] or ethylene glycol is introduced to DCS-NI units to impart good solubility in various common organic solvent. Comprehensive characterization, such as blend morphology, device physics, and materials photophysics, will be presented in this talk.



References

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