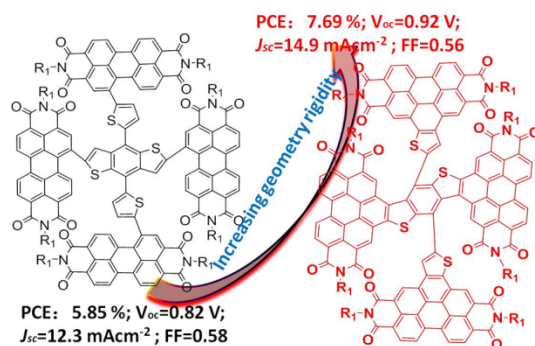


Propeller-Shaped Acceptors for High-Performance Non-Fullerene Solar Cells: Importance of the Rigidity of Molecular Geometry

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Caption: OPV properties as a function of molecular geometries of non-fullerene electron acceptors.

Scientific Achievement

New electron acceptors, β TPB6 and β TPB6-C, were developed for organic nonfullerene solar cells. It was found that the free rotation of PDIs renders β TPB6 with varying molecular geometries. The cyclization of β TPB6 yields β TPB6-C with high rigidity of the molecular geometry and enlarged conjugated skeleton. The inverted solar cells based on β TPB6-C and PTB7-Th as the donor polymer exhibited the highest efficiency of 7.69% with V_{oc} of 0.92 V, J_{sc} of 14.9 mAcm⁻², and FF of 0.56, which is 31% higher than that for β TPB6 based devices.

Significance

This work reveals design principles for nonfullerene electron acceptors. Both electronic and stereochemical properties of molecules can exhibit significant impact on final device performances.

Citation

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