

Advanced Molecular Design for Photoactive Nano and Bulk Materials with p/n-Heterojunction

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For addressing the imminent issue of energy, one of the principal subjects is to develop solar cells that are capable of efficiently converting light energy into electrical outputs. While silicon-based solar cells have been commercialized, there exists a strong demand for organic solar cells, because organic materials are flexible and easy to process. An ideal configuration for organic photovoltaics (PVs) consists of properly connected hole- and electron-transporting layers (p/n heterojunction), formed from electron-donating (D) and accepting (A) molecular components, respectively, with neither charge-transfer complexation nor macroscopic D/A segregation. Here we report a new design strategy of side-chain incompatibility for achieving p/n heterojunction in nanostructures and liquid-crystalline bulk materials.