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Tellurium-Containing Conjugated Materials for Solar Cells: From Sulfur to Tellurium

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Abstract

A series of diketopyrrolopyrrole(DPP)-based small molecules have been synthesized by palladium-catalyzed coupling reactions. Electron-donating moieties (benzothiophene, benzoselenophene, and benzotellurophene) are bridged by an electron-withdrawing DPP unit to generate donor-acceptor-donor (D-A-D) type molecules. We observe red-shifts in absorption spectra of these compounds by varying heteroatoms from sulfur to tellurium. In bulk heterojunction solar cells with [6,6]phenyl-C_{61}-butyric acid methyl ester ($PC_{61}BM$) as acceptor, we obtain power conversion efficiencies of 2.4% (benzothiophene), 4.1% (benzoselenophene), and 3.0% (benzotellurophene), respectively.

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