Synthesis of Benzodifuran Derivatives for Solar Cells

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Organic solar cells have become increasingly attractive due to the high costs of traditional fuel sources and the unwieldiness of silicon solar cells. This project aims to develop renewable materials based on furans, which are byproducts of many fermentation processes, with the potential to yield higher efficiencies. A thee-member-ring-quinone (benzodifuran) base for electron donors may be produced from 3-furaldehyde. In order to promote pi-stacking, a property which has been shown to increase electron mobility in organic materials, two structural varieties of dipropoxybenzene groups were synthesized and added to the 4,8-positions of the benzodifuran base. Subsequently, electron-withdrawing indanedione groups were added to the 2,6-positions through aldehyde addition and then substitution. Materials functionalized at only the 2-position and those functionalized at both were produced and analyzed by techniques including GC/MS and NMR spectroscopy. These materials are hoped to show pi-stacking and higher efficiencies when analyzed structurally and functionally. Such properties will give an indication of the potential represented by benzodifuran derivatives as a class.

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