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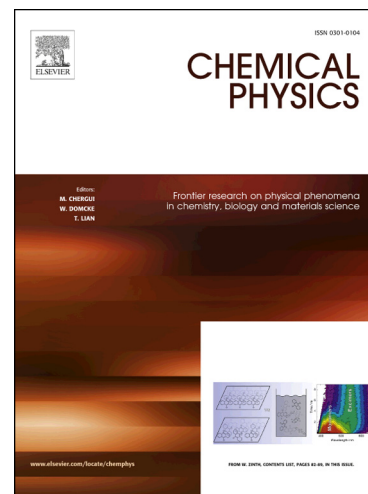
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Benzodichalcogenophene-Diketopyrrolopyrrole Small Molecules as Donors for  
Efficient Solution Processable Solar Cells

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**ABSTRACT:** Three small molecules named **BDTDPP**, **TBFDPP** and **BDFDPP** are designed and synthesized with alkoxy-substituted benzodichalcogenophene derivatives as donor unit while diketopyrrolopyrrole unit as acceptor unit, the investigation results show that all three small molecular materials possess favorable solubility, excellent thermal stability, broad absorption spectra and suitable electrochemical energy level. The bulk heterojunction devices based on these three small molecular materials show the power conversion efficiencies up to 3.19%, 2.82% and 2.81%, respectively. When adding 0.3% (v/v) 1,8-diiodooctane as additives, the power conversion efficiencies were further improved to 3.95%, 3.72% and 3.41%, respectively. The investigations show that all three benzodichalcogenophene-diketopyrrolopyrrole derivatives have great potential in the design of high performance optoelectronic materials.

**Keywords:** benzodichalcogenophene, diketopyrrolopyrrole, small molecules, solar cells, high performance, optoelectronic materials

### **Introduction**

Organic solar cells (OSCs) and organic thin film transistors are expected to partly replacing inorganic-based electronics and developing new applications, because of their lightweight, flexibility, low cost and environmental friendly<sup>1-4</sup>. Among them, materials of small molecule organic solar cell (SM OSC) have attracted much more attention due to their certain molecular structure and molecular weight, high purity

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