

Diindenoperylene (DIP) absorbers in small molecule organic solar cells

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Perylene is a well known organic semiconductor which is also an attractive absorber material for applications in small molecule organic solar cells.

Diindenoperylene (DIP) is the smallest representative of a Perylen based dye class of substituted DIPs which can be easily synthesized in a few steps from readily available products. This cost-efficiency and their thermal stability up to 560 °C make this materials very feasible for vacuum processed organic devices such as organic solar cells (OSC), transistors and organic light emitting diodes (OLED). The chromophoric system is furthermore accessible for further chemical reactions to tune the energetically values.

We have synthesized a variety of new materials, consisting of the DIP core with different phenyl- and alkyl side chains to influence the crystallinity.

To compare the DIP derivates, we characterized the compounds by TGA, CV, AFM, optical measurements and vacuum processed heterojunction solar cells to compare their usability in OSC. The normal stack of the OSC consists of C60 as electron acceptor and ETL, BPAPF as HTL and ITO coated glass as substrate.

In this standard stack our DIP Derivates act as donor type absorber material with its absorption maximum in the green region.