New Non-Fullerene Acceptors Based on Perylenediimide

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Bulk-heterojunction (BHJ) organic solar cells have attracted much research interests over the past decade due to their low cost, light weight and mechanical flexibility. Despite the remarkable success of fullerene-based organic cells, there are several critical drawbacks of fullerene materials, such as the high production cost, minimal absorption and poor stability. To overcome these problems, a variety of non-fullerene acceptors have been developed, which offer impressive PCEs and thus great promise for replacing the fullerene derivatives. Thus far, the most intensively studied polymer acceptors are those incorporating naphthalenediimide (NDI) as the main electron-accepting unit, which provided remarkable PCEs of over 8%. Another important building block of the acceptors widely used by us[1,2] and others is perylenediimide (PDI). However, compared to its versatile applications in sm all-molecule acceptor developments, PDI-derived polymer acceptors are less explored.[3-5]

In this presentation, we report the design and performance of a new polymer acceptor composed of PDI as the main building block. The all-polymer cells with the configuration of ITO/ZnO/PTB7-Th:PDI-X/V_2O_5/Al exhibited PCE up to 7.57% under the illumination of AM 1.5G 100 mW cm^{-2}. Remarkably, such a high PCE was achieved under additive-free and annealing-free conditions.

References

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