Synthesis and Optoelectronic Properties of Quinoidal 2,2′,6,6′-Tetraphenyldipyranylidene Towards Photovoltaic Applications

Organic solar cells and more recently perovskite solar cells have attracted a great attention in the scientific field of photovoltaics due to their low cost, simple fabrication and promising power conversion efficiency (PCE). With excitons photogeneration processes, charge carrier extraction is an essential step to achieve high performance solar cells. At the moment, the hole transport materials (HTM) are currently the bottleneck for the realization of cost effective and stable devices, thus it is mandatory to develop alternative materials having good transport properties and being easy to synthetize.

In this thesis report, we present the synthesis and electrical characterization of 2,2′,6,6′-tetraphenyldipyranylidene (DIPO-Ph4), a large quinoidal planar π-conjugated heterocycle. The good hole transport property of DIPO-Ph4, in addition with a proper HOMO level (~4.74 eV), makes DIPO-Ph4 a potential candidate for efficient hole-transporting material in emerging photovoltaic solar cells. The presented results will demonstrate that dipyranylidene could be an excellent building block for high mobility HTMs for organic solar cells or perovskite solar cells.

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