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Direct arylation as alternative to vintage cross-coupling reactions: towards novel conjugated hole transporting materials for highly efficient perovskite solar cells

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Organic semi-conducting materials based on conjugated polymers or small molecules, [1] are undoubtedly a technological revolution towards eco-friendly, low-cost and flexible devices for a variety of optoelectronic or electronic applications [2]. With few exceptions, the synthesis of most of these conjugated systems resorts to transition-metal-catalysed C-C cross-coupling reactions. This strategy usually implies the halogenation and functionalization of complementary building blocks by organometallic functional groups. To lower the overall cost, and avoid the use of toxic and environmentally unfriendly organometallic Ar_1-M reagent, it is critical to apply new synthetic methods either using cheaper reagents and/or reducing the total number of synthetic steps [3].

In recent years, direct arylation of C-H activated aromatic / hetero-aromatic moieties has emerged as an appealing alternative to conventional organometallic coupling reactions [4]. Since this method has proven to be perfectly geared for the preparation of polymeric and small active materials, we aim at preparing new accessible and eco-friendly materials and evaluate their properties in organic and hybrid photovoltaics [5]. In this work, novel conjugated hole transporting materials will be synthesized by direct arylation and their use in highly efficient perovskite solar cells will be reported.

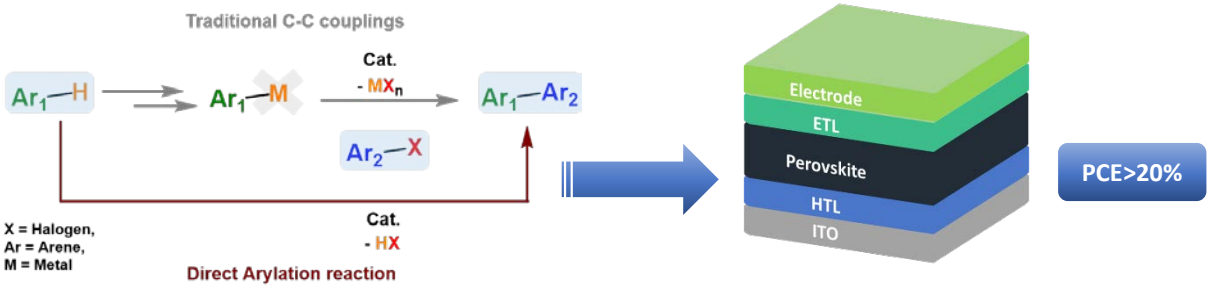

Figure 1. *Comparison of traditional Cross-Coupling reactions with Direct Arylation towards new hole transporting layers (HTL) for efficient p-i-n perovskite solar cells.*

References

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