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The increasing world energy demanding makes compulsory the search of energy sources alternative to fossil fuels. Among alternative energy source, the solar energy is green, renewable and not exhaustible. Perovskite Solar Cells (PSC), which rose in efficiency from the 3.2% (2012) to 22-23% in only 5-6 years,[1] are the new frontier of the photovoltaic research. Unfortunately, perovskites show instability towards moisture, which rapidly deteriorates the device performances. The use of polymeric Hole Transporting Material (HTMs) layers on the perovskite surface seems to overcome those problems, granting a good stability increase, since the optimal filming properties of hydrophobic polymers.

Most HTMs need to be doped to show good conductivity levels, useful for PSC cells, but doping agents are detrimental for cell stability since they are hygroscopic and, through them, water can reach the perovskite layer. Recently, we prepared P3HT and PTAA as HTM, but we are also interested into polymeric HTMs showing an inherent high conductivity, which recently became the new HTM research hot topic, the "dopant-free" conductive polymers.[2] To prepare a promising dopant-free polymer, a donor-acceptor monomer (**1**) was prepared by Suzuki coupling on a dibromoaldehyde derivative, followed by Knoevenagel condensation with malononitrile under microwaves. The final polymerization using $FeCl_3$ gave a red colored polymer (**2**). The polymer was characterized by NMR, GPC, UV, Fluorescence, and CV, thermal analysis (TGA and DSC). A high molecular weight polymer was obtained, showing very good thermal stability. The HOMO and LUMO levels, obtained by electrochemistry and spectroscopy, showed that the polymer can be considered an interesting HTM for perovskite solar cells.

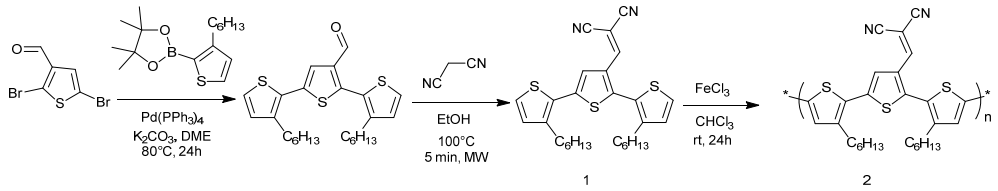

Figure 1: Scheme for the synthesis of the monomer (**1**) and the polymer (**2**).

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References:

[1] M. Green and A. Ho-Baillie, *ACS Lett.* **2017**, *2*, 822-830.
[2] W. Zhou, Z. Wen, and P. Gao *Adv. Energy Mater.* **2018**, 1702512.