Hydrogen-bonding as a strategy for charge stabilization in organic field effect transistors.

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Organic materials have proven to be efficient active materials in electronic devices, such as organic field effects transistors (OFETs) or organic solar cells. The versatility of organic synthesis allows us to endow small molecules or polymers with the desired optoelectronic properties. However, the final efficiency of a given device is not only based on the molecular design but also on the way the molecules assemble. In this sense, non-covalent interactions play a crucial role as they are able to control the supramolecular assembly. Hydrogen-bonds have proven to be a promising strategy to efficiently enhance charge transport. In this project, two compounds have been studied, based on a straightforward diketopyrrolopyrrole (DPP) with a thiophene-capped as the electroactive component and amide groups serving as the hydrogen-bonding units[1]. Theamide groups are positioned with two different topologies, C-centered (**HDPPBA-C**) or N-centered (**HDPPBA-N**). We have compared these materials with the control derivative, **HDPPH**, whose structure lack amide groups (Figure 1). Finally, the potential of these semicondcutors as active components in organic electronics have been tested in organic field effects transistors (OFETs).

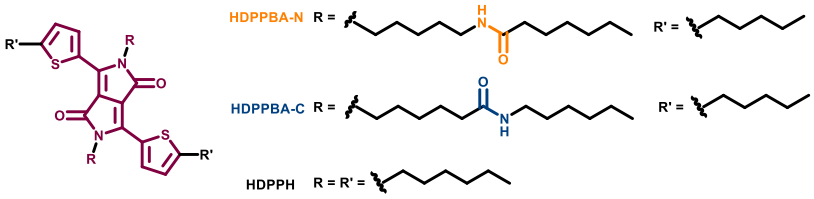

Figure 1. Chemical structures of semiconductors **HDPPBA-N**, **HDPPBA-C** and **HDPPH.**

References

1. Ávila-Rovelo, N. R. *et al.* Hydrogen-Bonded Organic Semiconductors with Long Charge Carrier Lifetimes. *Journal of Physical Chemistry C* **126**, 10932–10939 (2022).