

Molecular Materials For Organic Electronics

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Organic materials have proven to be efficient active materials in electronics, being possible alternatives to inorganic semiconductors 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-bonding has been proven a promising strategy to improve the film morphology in organic electronic devices with semiconductors able to efficiently transport charges. 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 units¹. The amide groups are positioned with two different topologies, C-centered (**C-1**) or N-centered (**N-1**) which are five carbons apart from the lactam rings of the DPP. We have compared these materials with the control derivative, **1**, whose structure lack amide groups (Figure 1). Finally, the potential of these semiconductors as active components in organic electronics have been tested in organic field effects transistors (OFETs).

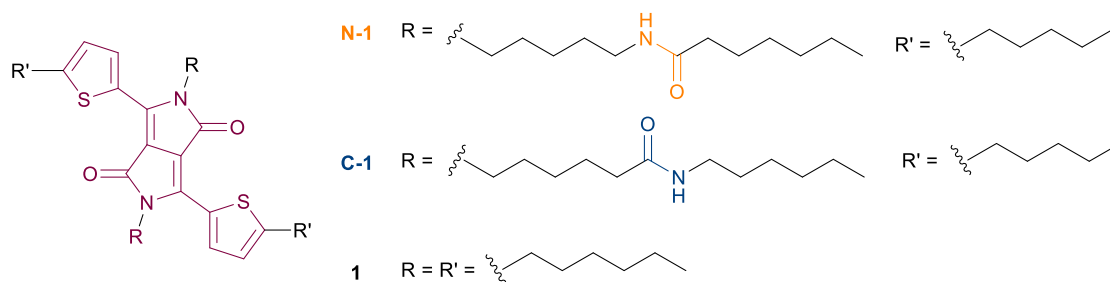


Figure 1. Chemical structures of semiconductors **N-1**, **C-1** and **1**.

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).