

Urea-containing supramolecular semiconductors based on diketopyrrolopyrrole systems

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ABSTRACT: Hydrogen bonding is one of the strongest interaction (1-10 kcal/mol) with non-destructive characteristics. This interaction can provide an efficient way to control the molecular packing, an orientation of conjugated polymers and organic molecules leading to significant changes in their electrical and optical properties without disturbing the intrinsic properties of the materials¹. We explore H-bonding Diketopyrrolopyrrole (DPP) derivatives as model which are organic dyes discovered in 1970's, based on a heterocyclic dilactam with two amide function in opposite (**figure 1a**)². Due his extended π -conjugated structure between their electron-rich and electron-deficient units, these molecules used in organics electronics device such as organic photovoltaics (OPVs), organar field-effect transistors (OFETs) get charge carri properties, optoelectronic properties, an excelle stability, a low solubility and an intense red colk. Their properties can be shaped by substitutions many positions and H-bonding incorporation. These substitutions allow the solubility in organic solvents to be increased and modify the optoelectronic properties whereas H bonding direct the self-assembly towards different supramolecular structures with different optoelectronic properties³ (**figure 1b, 1c**). We purpose to present H bonding effect on DPP optoelectronics properties and focus our work on synthesis of a DPP functionalized by an urea alcan (**figure 1c**).

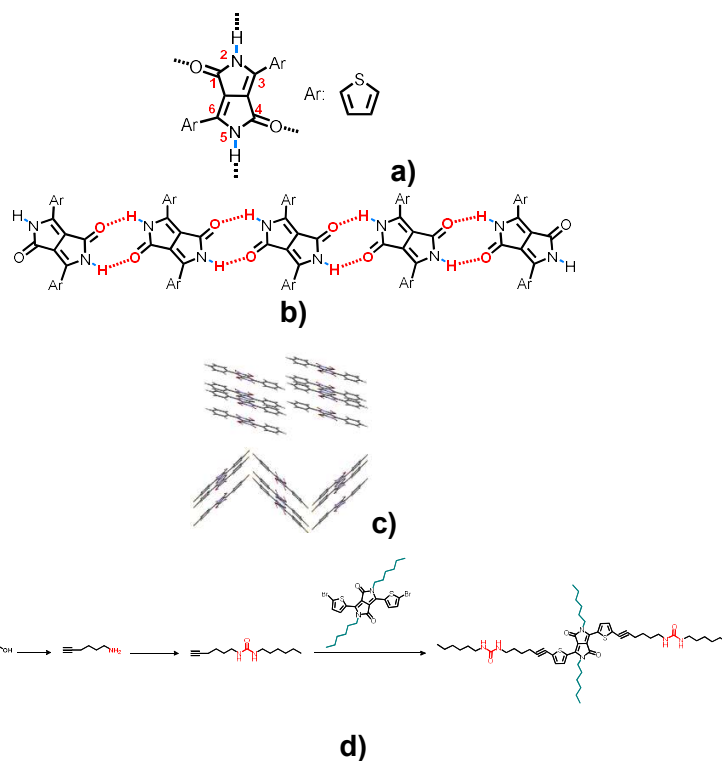


Figure 1: a) Global representation of DPP core functionalized by thiophene (dashed lines show where hydrogen bonds are formed with neighboring molecules), b) Schematic representation of H-bonding of DPP, c) Crystal structures of DPPs. The red lines indicate H-bonds, d) global pathway for a DPP urea synthesis.

KEY WORDS: Diketopyrrolopyrrole, H-bonding, organic electronic, urea alcan, optoelectronic properties, self-assembly.

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