Triindoles as excellent platforms for organic semiconductors: from crystalline molecules to porous polymers

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Organic semiconductors are one of the most promising candidates for next-generation electronics applications. In this sense, triindole-based systems have demonstrated great potential as p-type semiconductors in organic field-effect transistors (OFETs).[1] In this project, a mixed experimental and theoretical study of three new crystalline N-trimethyltriindoles endowed with different functionalities at 3, 8 and 13 positions are investigated (Figure 1a), with the main goal of exploring the correlation between the electronic nature of the substituents and their solid-state organization and semiconductor behavior.[2] On the other hand, the design and synthesis of covalent organic framework materials (constructed from the union of different covalently linked conjugated platforms) is being deeply investigated in organic electronic.[3] Recently, in collaboration with the groups of Dr. Berta Gómez-Lor and Dr. Jose Ignacio Martínez, we have theoretically studied how the structural and the electronic properties of new porous triindole-based polymers (Figure 1b) can be modulated by the (i) modification of the linkage position from para (T_2) to meta (T_3), (ii) by the insertion of different π-bridges (phenylene or alkyne) between the cores and (iii) by the increment of the number of π-bridges from 3 to 6 units ($T_{2,3}$).[4]

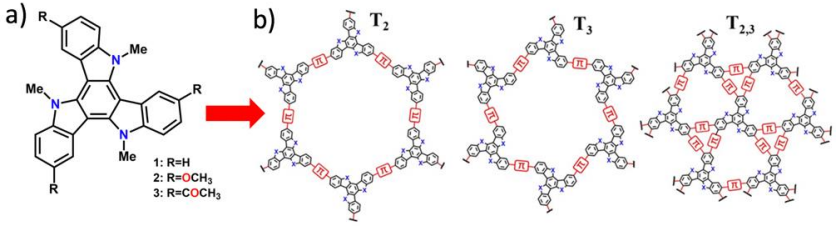

Figure 1. Chemical structures of triindole-based building block (a) and their corresponding porous polymers (b).

References

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