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Optoelectronic processes in triphenylamine-based 2D covalent organic frameworks

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Bidimensional, porous, crystalline, covalent organic frameworks (2D COFs) are currently an appealing candidate for advanced applications in optoelectronic devices. The combination between the vast choice of building-blocks and linkages available enable the fabrication of polymeric materials with specific functionalities and adjustable plane-extended pi-conjugation.[1]
Recently, triphenylamine (TPA)-based moieties have emerged as possible building-blocks in 2D COFs. TPA is a thermally stable, propeller-shaped molecule which exhibits interesting photoactive and electroactive behaviors. These features are related to the stability of corresponding radical cation, easily generated by mono-electron oxidation. TPA-based advanced materials such as molecular derivatives, linear and branched polymers have been developed for various optoelectronic applications such as photoconductive, light-emitting, electrochromic devices and especially as hole transporting materials.[2]
Herein, we report the integration of two types of triphenylamine (TPA) moieties in 2D COF thin films. Polymerization of the C_3-symmetric tris(4-aminophenyl)amine with linear dialdehydes leads to the formation of a hexagonal topology while the reaction of the C_2-symmetric N,N,N',N'-tetrakis(4-aminophenyl)-1,4-phenylenediamine with the same dialdehydes leads to the formation of a Kagome topology.[3] Our results show appealing photoconductive and hole-transporting properties of the resulting materials and suggest that the topology of the framework might have a deep impact in the final behavior.[4]

References

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