[MS25 - 02] Purely Organic Frameworks Self-Assembled via Orthogonal Hydrogen and Halogen Bonding. Giancarlo Terraneo, Luca Colombo, Gabriella Cavallo, Pierangelo Metrangolo, Tullio Pilati, Giuseppe Resnati.

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The last two decades have seen a growing interest in the field of metal-organic frameworks (MOFs) [1], crystalline materials composed of self-assembled organic ligands and metal cations. The strength and directionality of coordination bonds allowed the design and the obtainment of a number of tuneable, porous and robust materials. Following the same self-assembly approach, a smart use of supramolecular interactions, recently enabled the obtainment of metal-free purely organic frameworks. The intrinsic flexibility of the connections involved in the network formation allowed the realization of responsive materials with applications in fields like as gas adsorption [2], conductivity [3] and molecular transport [4]. Halogen bonding (XB) is a powerful tool in supramolecular chemistry [5], often seen in competition with the most commonly used hydrogen bond (HB). Here we show that it is possible to use XBs and HBs in a cooperative way for the construction of purely organic frameworks.[6] Two new ligands (*meso* and *rac*-4,4'-[1,2-bis(2,3,5,6-tetrafluoro-4¬iodophenoxy)ethane-1,2-diyl]dipyridine) able to be involved in both XB and HB has been designed and synthesized. Using the selected ligands several purely organic open frameworks with different topologies were synthesized via XB and HB orthogonal self-assembly. Remarkably in all the obtained networks large voids are present, filled with solvent molecules. The robustness of the networks and the accessibility of these spaces have been demonstrated in one case via single crystal-to-single-crystal (SCSC) guest exchange from liquid and gas phases.

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