Fluorinated Porous Organic Cage Compounds

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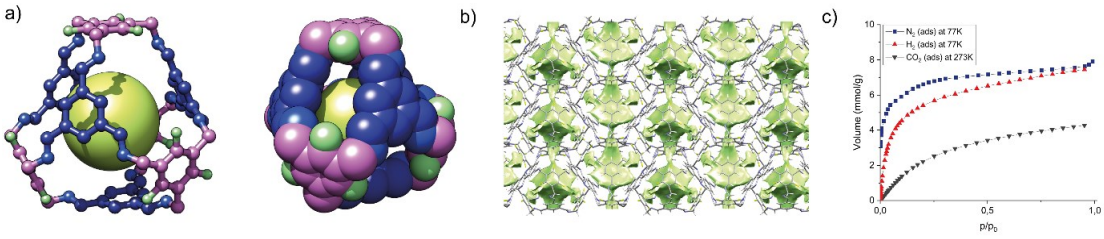
Keywords: supramolecular chemistry; porous organic cages; fluorine chemistry; organic cages; dynamic covalent chemistry

Supramolecular chemistry continued to evolve in the last decades and successfully found its way into nanotechnology and materials. In addition to the properties of metal-organic frameworks (MOFs) and metal-organic cages, covalent-organic frameworks (COFs) and porous dynamic-covalent cage compounds (POCs) attracted tremendous attention in the past years.[1] We focus on the synthesis and characterization of novel POCs by inverting the electron density of the aromatic panels used for the self-assembly by fluorination. This not only creates highly reactive building blocks for dynamic covalent imine chemistry, but also hydrophobic nanospaces within the formed cage compounds. These cages show distinct gas adsorption properties and significantly increased thermal stabilities, exemplarily shown by the synthesis of the first highly fluorinated, porous, organic [4+4] imine cage, **FC1**, containing perfluorinated aromatic panels und hydrogenated panels.[2]



Gas adsorption experiments show an uptake of 19.0 wt% CO_2 (4.2 mmol g^{-1}, 273 K and at 1 bar) and 1.5 wt% H_2 (7.5 mmol g^{-1}, 77 K and at 1 bar) for the specific surface area of 536 m^2 g^{-1} of the crystalline **FC1** material obtained directly from the reaction mixture. Combined with an outstanding thermal stability, a very interesting porous material for further research regarding exciting properties of this new class of organic cages is presented. Additionally, the unique reactivity of the employed building blocks will be showcased by studies regarding organic [4+6] imine cage formation.

1) T. Hasell, A. I. Cooper, *Nat. Rev. Mater.* **2016**, *1*, 16053. 2) T. Kunde, E. Nieland, H. V. Schröder, C. A. Schalley, B. M. Schmidt, *Chem. Commun.* **2020**, *56*, 4761.