MS83.O02

Synthesis and post-synthetic modification of metal-organic frameworks

A. Burrows[1]

[1]*University of Bath, Department of Chemistry, Bath, UK*

Metal-organic frameworks (MOFs) are currently attracting considerable interest due to their porosity, and the exploitation of this in a wide range of applications as diverse as hydrogen storage, carbon capture, catalysis and drug delivery. Here we present our recent work on the preparation of functionalised MOFs through two post-synthetic modification protocols. We have used a range of organic transformations including oxidations and tandem modifications involving either diazonium salt formation or reductive amination to undertake covalent modifications of reactive 'tag' groups on the linkers.[1] In addition, we have used a post-synthetic exchange approach to substitute one linker with another. We have compared the MOFs prepared post-synthetically with those that can be accessed by direct combination of metal salt and functionalised linker. We also report on the synthesis and structure of mixed-component MOFs, in which two or more linking ligands have the same structural role.[2] We reveal the role of solubility in the uneven distribution of the ligands in the crystals, and illustrate how the ratio of ligands used in the synthesis can affect the pore structure. Finally we present recent developments in the synthesis of MOFs containing the biologically active molecule deferiprone, and show how this can be released from MOF.[3] This illustrates the potential of MOFs to act as reservoirs for drug molecules.

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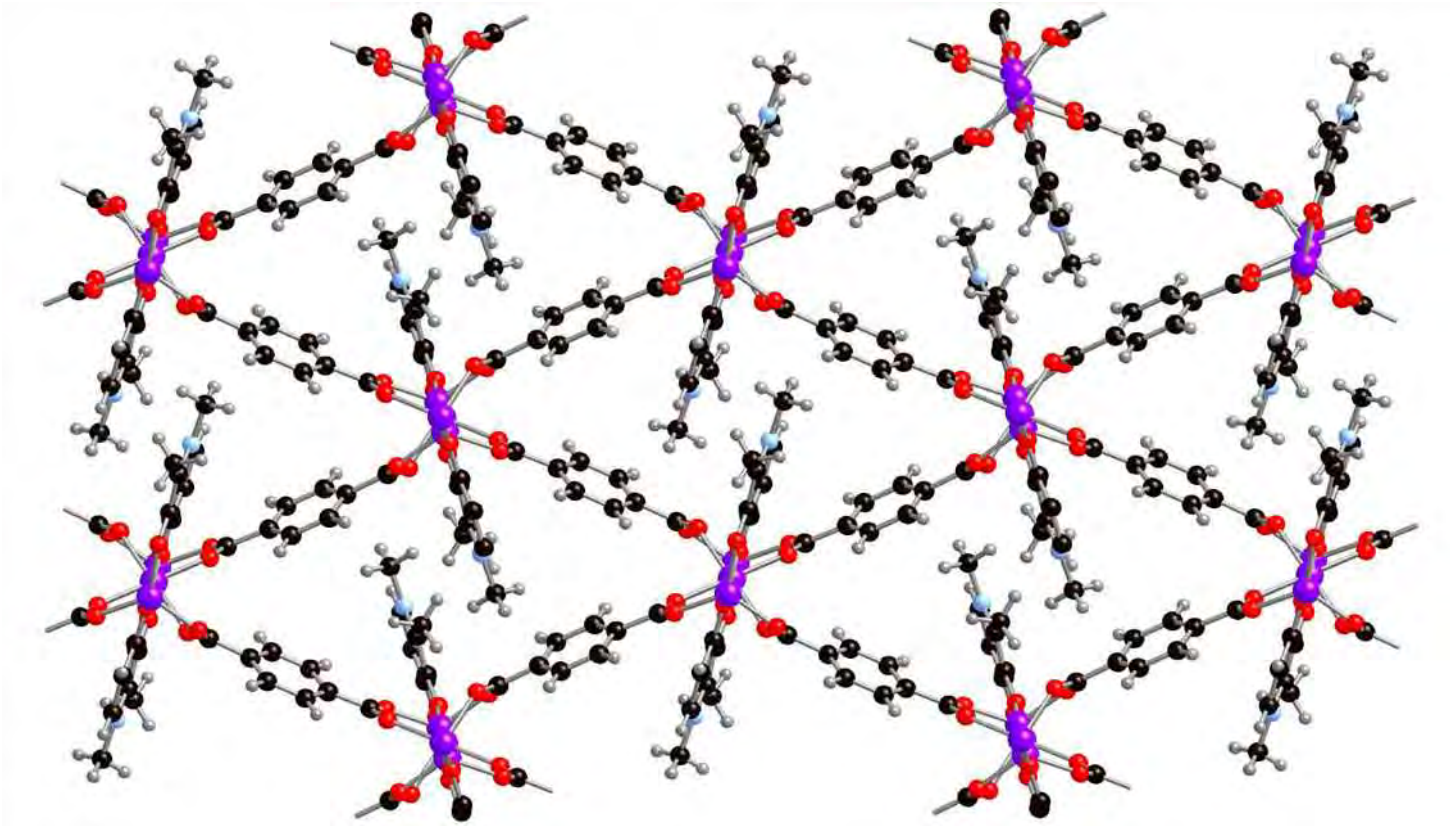

Keywords: Metal-organic frameworks, Porous coordination polymers, Post-synthetic modification