Carlos Martí-Gastaldo

Functional Inorganic Materials Team, Instituto de Ciencia Molecular, Universidad de Valencia

Natalia.munoz@uv.es; carlos.marti@uv.es; @FuniMAT

Abstract

Reticular chemistry has boosted the design of thousands of metal and covalent organic frameworks for unlimited chemical compositions, structures, and sizable porosities. The ability to generate porous materials at will based on geometrical design concepts is responsible for the rapid growth of the field and the increasing number of applications derived. Despite their exceptional stability, the synthesis of targeted homo- and heterometallic titanium-organic frameworks amenable to these principles is relentlessly limited by the high reactivity of this metal in solution that impedes the controlled assembly of titanium molecular clusters. We will describe our recent results in the synthesis of new titanium organic frameworks by using high throughput methodologies. This approach permits producing porous crystals at high scale, that can help implementing new concepts towards energy conversion with molecular frameworks due to their unique combination of high surface area, crystallinity, photoactivity and tailorable catalytic activity

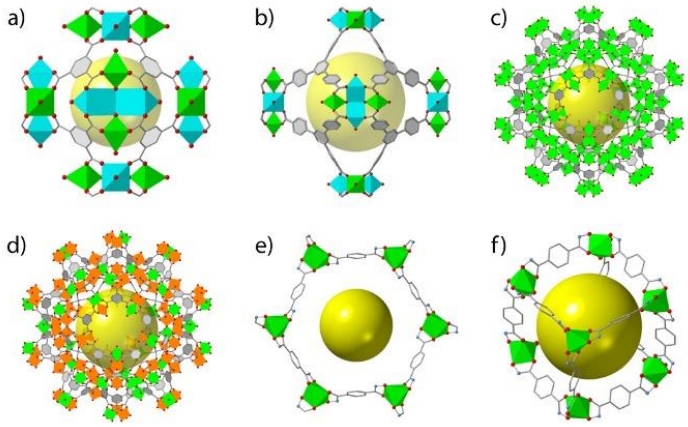

Figure 1. Structure of homo- and heterometallic Ti-MOFs: a) MUV-10, b) MUV-12, c) MIL-100(Ti), d) MUV-101(M), e) MUV-11 and f) cMUV-11. MUV stands for Materials of the Universidad de València

Key References

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Biosketch

Carlos Martí-Gastaldo was initially trained in Coordination Chemistry and Molecular Magnetism in E. Coronado´s group at the ICMol-University of Valencia (PhD 2009), before shifting focus to apply his training to the design of Metal-Organic Frameworks during my postdoctoral stage as a Marie Curie Fellow in M. J. Rosseinsky's group at the University of Liverpool (2010-2012). He began his independent career in 2013 in Liverpool, with the award of a Royal Society University Research Fellowship. In 2014, he returned to the ICMol with a Ramón y Cajal Fellowship to lead the design of highly stable MOFs, one of the strategic research lines of the 1st 'María de Maeztu' Excellence program awarded to the center. With the award of an ERC Starting Grant in 2016, he established his own research group at the ICMol. The Functional Inorganic Materials team (FuniMat; www. funimat.es) is focused on the design and processing of porous inorganic materials for biological and environmental-related applications. He has founded the start-ups 'Porous Materials for Advanced Applications' S. L. (2018) and 'Porous Materials in Action' S. L. (2021) (www.porousinaction.com) to accelerate the transfer of research results into socially useful products and services. He received an ERC Consolidator Grant in 2021 and is one of the guarantor investigators of the 2nd 'María de Maeztu' Excellence program of ICMol (2021-2024), and main responsible of the implementation of a new research line for the Molecular Design of Biomaterials in the center.