

# New Novel Metal-Organic Frameworks Based on Polynuclear Rare-Earth Metal Clusters

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Metal-Organic Frameworks (MOFs) are porous crystalline materials created through the coordination of metal ions or clusters with organic bridging ligands [1]. These frameworks can form one-dimensional (1D), two-dimensional (2D), or three-dimensional (3D) networks, each containing potential voids or pores. For example, MIL-53 and CAU-10 result by the combination of an aluminum rod with simple ligands such as terephthalic or isophthalic acid respectively. In another case, the polymerization of the hexanuclear cluster,  $Zr_6$ , by a dicarboxylate ligand can result in a variety of MOFs, with UIO-66 being a prominent example due to its water stability, porosity, and ease of synthesis. Similarly, Rare-Earth (RE) metals can form analogous clusters with F/OH bridges, leading to the development of RE-UIO-66 analogs [2]. These analogs are notable for their stable and positively charged frameworks.

Our approach was to investigate whether additional MOFs can be synthesized using simple dicarboxylate ligands and known clusters. We also explored which other polynuclear Rare-Earth (RE)-based clusters can serve as secondary building units (SBUs) for the formation of these structures, leading to the isolation of a new series of RE-based MOFs with different nuclearities.

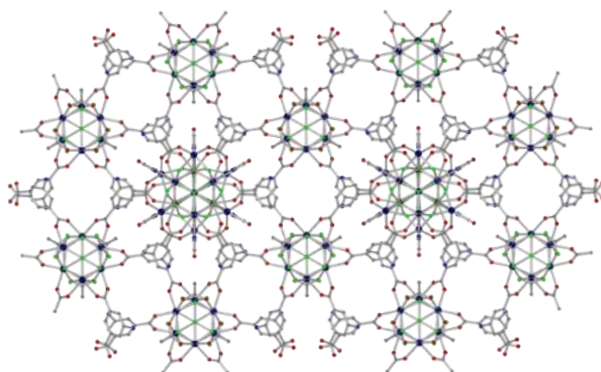


Figure 1: The 3D crystalline structure of our new MOF down the crystallographic axis *c*.

## References:

- [1] O. M. Yaghi and H. Li, *J. Am. Chem. Soc.*, 1995, 117, 10401–10402.
- [2] J. P. Vizuet, et al, *J. Am. Chem. Soc.*, 2021, 143, 43, 17995-18000.

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