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TOPIC(s) : Homogenous, heterogenous and biocatalysis / Waste valorization

Covalent Organic Frameworks - Highly versatile and metal-free adsorbents and catalysts.

## AUTHORS

Pascal VAN DER VOORT / GHENT UNIVERISTY, KRIJGSLAAN 283, BUILDING S3, GHENT

## PURPOSE OF THE ABSTRACT

Covalent Organic Frameworks - Highly versatile and metal-free adsorbents and catalysts.

Pascal Van Der Voort ? Center for Ordered Materials, Organometallics and Catalysis ? Ghent University ? Belgium ? pascal.vandervoort@ugent.be ? comoc\_research@twitter.com

Covalent Organic Frameworks (COF), especially the nitrogen rich C=N containing ones like the Covalent Triazine Frameworks (CTF) and the imine-COFs, have characteristics of MOFs, but also characteristics of carbons and of polymers. Contrary to MOFs, they contain no metals, unless metal complexes are deliberately included or anchored.

Due to their high surface area and pore volume, tunable porosity, crystallinity and very high stability even in water, these materials have an enormous potential in adsorption, catalysis, as electrodes and many more applications.

At the Center for Ordered Materials, Organometallics and Catalysis, these materials are being studied for a few years, next to MOFs, PMOs and other materials.

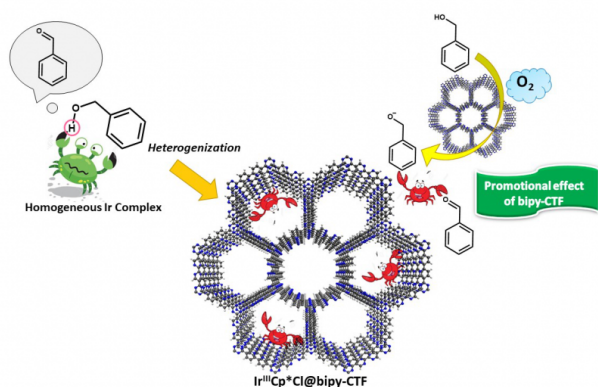
We developed in 2018 several CTF materials for selective CO<sub>2</sub> capture[1], for selective Arsenic removal[2], for heterogeneous catalysis by creating a novel "acac-CTF"[3] and for aerobic alcohol oxidation using Ir(III) complexes(\*). In the latter, we already got strong clues on the synergistic role of the CTF support in these oxidation reactions.

Most recently we elaborated further on this and discovered the unprecedented promotional effect of CTF supports in aerobic oxidation reactions. We have developed a stable, recyclable metal-free oxidation catalyst for the oxidation of alcohols by air in green conditions(\*). I will explain the role of the CTF support in the metal-free alcohol oxidation and discuss the huge potential of these materials in other metal-free green conversions.

It is clear that N-rich Covalent Organic Frameworks and Covalent Triazine Frameworks will have a great future and are practically usable on a larger scale. There are still challenges though, such as the (harsh) reaction conditions for the CTFs and the crystallinity of both CTFs and COFs but strong progress is made in this area. I will try to give a fair overview on the strengths and weaknesses of the nitrogen-rich COFs and CTFs.

(\*) Submitted / in press

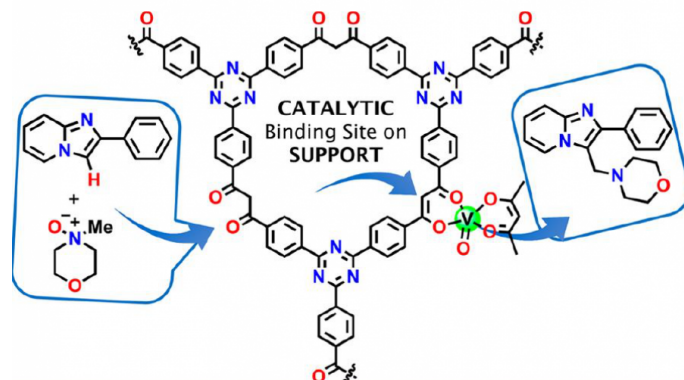
## FIGURES



**FIGURE 1**

Figure 1: Synergistic effect of CTF in the aerobic oxidation of alcohols by Ir(III) complexes.

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**FIGURE 2**

Figure 2: Acac-CTF, a new material for heterogeneous catalysis

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## KEYWORDS

Covalent Organic Framework (COF) | Covalent Triazine Framework (CTF) | Heterogeneous catalysis | Aerobic oxidation

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