

Post-modification of a gallium based metal-organic framework, COMOC-4 as a catalyst for the epoxidation of cyclic olefins

Hannes Depauw^a, Karen Leus^a, Pascal Van Der Voort^a

^aGhent University, Department of Inorganic and Physical Chemistry, Center for Ordered Materials, Organometallics & Catalysis, Krijgslaan 281-S3, 9000 Ghent

Metal-organic frameworks (MOFs) are crystalline porous materials consisting of metal ions held in place by multidendate organic linkers to build up a framework. Nowadays, MOFs are examined for many potential applications, for example in gas sorption and separation, sensing, luminescence and in catalysis. In the latter field, numerous reports have shown the potential of MOFs as supports to anchor homogeneous complexes.[1,2] Very recently we synthesized a gallium 2,2'-bipyridine-5,5'-dicarboxylate MOF, denoted as COMOC-4 via both solvothermal and microwave synthesis procedures. The bipyridine linkers of this open MOF with a MOF-253 topology are ideal anchors to graft metal complexes for advanced heterogeneous catalysis.[3]

In this work, the post-modification of COMOC-4, with a Mo-complex is presented.[4] The resulting Mo@COMOC-4 was characterized by means of N₂ sorption, XRPD, DRIFT, TGA, XRF, XPS and TEM analysis. Moreover, the Mo@COMOC-4 was evaluated as a catalyst in the epoxidation of cyclooctene and cyclododecene employing TBHP in decane as oxidant. The post-modified COMOC-4 shows a high selectivity towards the epoxide (up to 100 %). Regenerability and stability tests have been carried out demonstrating that the catalyst could at least be recycled for 3 runs without leaching of Mo and loss of crystallinity.

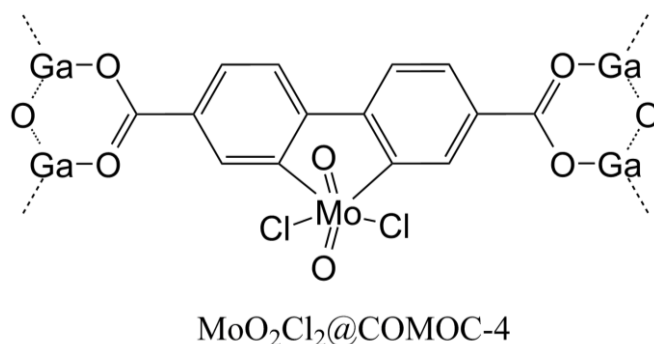


Figure 1: Schematic representation of Mo@COMOC-4

[1] Eric D. Bloch, Omar M. Yaghi et al. J. Am. Chem. Soc., **132**, (2010), 14382-14384

[2] Leus K., Van Der Voort P. et al. Catalysis Today, **208**, (2013), 97-105

[3] Liu Y.Y., Van Der Voort P. et al. ChemCatChem., **5**, (2013), 3657-3664

[4] Leus K., Liu Y.Y., Van Der Voort P. et al. manuscript in preparation.

E-mail: hannes.depauw@ugent.be

www: <http://www.we06.ugent.be/comoc>