



## POSTECH-Ghent University BK On-line Lectures for Sustainable Environment<sup>†</sup>

### Progress in CO<sub>2</sub> Utilization: from homogeneous to heterogeneous catalysts



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**Time:** 17:00-18:00 (Korea time)

**Zoom Seminar:** 893 5911 5499 (PW 0407)

<https://us02web.zoom.us/j/89359115499?pwd=VmU3eE1IRnVvU3BtdWJWRFBYU3pRQT09>

#### ABSTRACT

With modern industry development, carbon dioxide (CO<sub>2</sub>) has attracted more and more attention as its unignorable influence on the greenhouse effect. While in the aspect of synthetic chemistry, CO<sub>2</sub> is considered as an ideal C1 source for its merits, such as nontoxicity, economy, renewability, and abundance. Based on this, the transformation of CO<sub>2</sub> into organics using homogeneous catalysts has become a highly promising area in modern green and sustainable chemistry. Up to now, numerous strategies have been developed to effectively utilize CO<sub>2</sub> for the synthesis of valuable chemicals. Moreover, also heterogeneous catalysts are intensively investigated for the utilization of carbon dioxide, especially Metal-Organic Frameworks (MOFs). MOFs are non-conventional porous materials having a broad spectrum of applications. The catalytic use of MOF-based materials is cutting-edge in the field of scientific and technological developments. Recently, MOFs are being investigated as promising catalysts for synthesizing of industrially important cyclic carbonates under solvent-free ambient conditions. A wide variety of terminal and internal substrates are converted efficiently with high selectivity. MOFs as heterogeneous catalysts are remarkably stable and have structural rigidity, hence recycled for subsequent use with almost the same activity. Therefore, MOF-catalysts are highly efficient for the cycloaddition of CO<sub>2</sub> to epoxides into cyclic carbonates

#### SPEAKER'S BIOGRAPHY

His main research interests concern the structure and mechanisms of organometallic material chemistry, synthesis and functionalization of nanomaterials for catalysis and energy applications; green chemistry and processes: nanocatalysts, MOFs and MOPs, conjugated porous materials, water splitting, olefin metathesis, (bio)polymers, CO<sub>2</sub> utilization. For about two decades, Prof. Francis Verpoort (H-index = 56 in Google scholar) has carried out broad and fruitful teaching and research activity at Ghent University in various areas of chemistry such as organometallics, catalysis, molecular spectroscopy, related with remarkable applications in the production of fine chemicals and advanced polymeric materials. Moreover, his practical abilities allowed him to highly valorize the research outcome in a spin-off company from Ghent University in the production of commercial ruthenium-based metathesis catalysts (CAS registry number: 934538-04-2 and 934538-12-2) applied successfully in organic and polymer syntheses. This proves his ability to transfer technology into the industry and demonstrates his expertise to create potential social and economic advantages for the society.

He has developed an extensive international scientific cooperation with scientists worldwide, taking part as an active member in different international scientific organizations, as well as in numerous successful bilateral collaboration projects with foreign academic institutions and universities in Europe, China, Russia, India, UAE, etc. In 2011 he was also appointed as Chair Professor at Wuhan University of Technology (China), where he established a research group covering organometallics and materials chemistry. He was appointed as "National Distinguished Expert" in China (2012), proving his research and management skills. As a result of his innovative research activity, he contributed with a considerable number of book chapters, more than 350 full papers, and 20 international patents to the international scientific literature. Some of his articles are among the top 1% highly cited articles in the Royal Society journals.

<sup>†</sup> This Zoom seminar is hosted to celebrate the 120<sup>th</sup> anniversary of diplomatic relations between Belgium and Korea. All Interested Are Welcome.