Contribution ID: **758** Type: **Oral**

Supported vanadium oxides modified by non-thermal plasma for nitrogen fixation

Thursday 27 June 2019 11:15 (15 minutes)

Plasma-assisted surface modification of silica supports and fully synthesized vanadium oxides was performed in a direct current hollow cathode discharge plasma sustained in O_2 gas. Operational plasma parameters, such as pressure, discharge power, and exposure time were also optimized to reach the highest possible plasma treatment effect. The modified catalysts were characterized using different techniques such as X-ray diffraction, X-ray photoelectron spectroscopy, scanning electron microscopy, Brunauer–Emmett–Teller, Fourier transform infrared, and inductively coupled plasma atomic emission spectroscopy. The results showed that the surface active sites of these catalysts were enhanced with the treatment of plasma, which improved the dispersion of the catalysts [1]. In addition, the average pore size was slightly enlarged, and the pore size distribution of the catalyst became wider. The XPS results revealed that the non-thermal plasma increased the oxygen functional groups on the catalyst's surface, which contributed to their increasing activity [2]. Next, these active catalysts were introduced into a negative direct current multi-pin-to-plate glow discharge reactor generated in N_2/O_2 gas mixture in order to be used for N_2 oxidation. It was shown that the use of the catalyst resulted into the synthesis of NO_x products. This study confirms that non-thermal plasma treatment is an effective tool to manipulate the catalyst surface properties for N_2 fixation processes.
[1] X. Zhang, W. Sun, C. Wei, Effect of glow discharge plasma treatment on the performance of Ni/SiO_2 catalyst in CO_2 methanation, Journal of Fuel Chemistry and Technology, 41 (2013) 96-101.
[2] C. Liu, J. Lan, F. Sun, Y. Zhang, J. Li, J. Hong, Promotion effects of plasma treatment on silica supports and catalyst precursors for cobalt Fischer–Tropsch catalysts, RSC Advances, 6 (2016) 57701-57708.

Author: Ms BITAR, Rim (Gent University)

Co-authors: Ms ADHAMI SAYAD MAHALEH, Moazameh (Gent university); Dr NIKIFOROV, Anton (Gent University); Dr LEUS, Karen (Gent university); Prof. VAN DER VOORT, Pascal (Gent University); Prof. MORENT, Rino (Gent University); Prof. DE GEYTER, Nathalie (Gent University)

Presenter: Ms BITAR, Rim (Gent University)

Session Classification: 6.1 Nonequilibrium Plasma Applications II

Track Classification: 6.1 Nonequilibrium Plasma Applications