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VABILO NA PREGLOV KOLOKVIJ / INVITATION TO THE PREGL COLLOQUIUM

Prof. Dr. Angelos M. Efstathiou

Chemistry Department, Heterogeneous Catalysis Laboratory, University of Cyprus, 1 University Avenue, University Campus, 1678 Nicosia, Cyprus

Četrtek / Thursday, 19. 2. 2015, ob / at 13:00

Velika predavalnica Kemijskega inštituta / Lecture Hall at the National Institute of Chemistry, Hajdrihova 19, Ljubljana

Fundamental Understanding of De-NOx and WGS Catalysis Using Transient and Transient Isotopic Techniques

The development of new green industrial NO_x control catalytic technologies operated in a low-temperature range (ca. 120-200^oC), and based on other than ammonia reducing agents, remains a very important target since it could reduce the operational and investment costs compared to the present NH_3- and urea-SCR technologies, and be easily retrofitted in existing industrial plants. The design of such new de-NO_x catalytic systems would largely be facilitated if important kinetic and mechanistic information at the molecular level can be obtained using *in situ* kinetic and spectroscopic techniques (*operando* methodology). For example, the design of an industrial supported metal/metal oxide catalytic system would require to know whether and to what extent the support material influences the catalytic rate (*bifunctional* catalysis). It becomes also important to know how the support chemical composition influences specific kinetic parameters, such as the surface concentration of the active intermediate species, their site reactivity (k, s^{-1}), and the chemical nature of the active intermediates that are found in the rate-controlling step.

The application of Steady-State Isotopic Transient Kinetic Analysis (SSITKA) technique and other transient isotopic experiments coupled with infrared spectroscopic measurements have proven to provide significant understanding towards several important de-NO_x catalytic reactions. The latter is demonstrated through the present lecture by providing examples from the literature regarding the H_2-SCR of NO_x control. In particular, the effect of support chemical composition, Pt metal particle size, and reaction temperature on supported-Pt performance, the nature, location (metal vs. support) and surface concentration of active and inactive NO_x adsorbed reaction intermediate species, and the role of gaseous oxygen on the de-NO_x reaction rate and N_2-selectivity will be reviewed.

The application of similar techniques towards the understanding of essential mechanistic aspects of the Low-Temperature Water-Gas Shift Reaction will also be illustrated over supported Pt catalysts.

[1] C.N. Costa, A.M. Efstathiou, J. Phys. Chem. C 111 (2007) 3010.
[2] P.G. Savva, A.M. Efstathiou, J. Catal. 257 (2008) 324.
[3] C.M. Kalamaras, S. Americanou, A.M. Efstathiou, J. Catal. 279 (2011) 287.
[4] C.M. Kalamaras, D. Dionysiou, A.M. Efstathiou, ACS Catalysis 2 (2012) 2729.

Vljudno vabljeni! / Kindly invited!

info: prof. dr. Albin Pintar; albin.pintar@ki.si