Subject Proposal for Erasmus Students in Chemistry

"New supported transition metal nano-oxide catalysts for complete oxidation of Volatile Organic Compounds"

One of the research topic at the Laboratory of Catalysis and Solid State Chemistry of Lille (UCCS) is the development of active catalysts for total oxidation of Volatile Organic Compounds (VOC) which are recognized as major contributors to air pollution and are therefore harmful to the environment and human health. Catalytic oxidation is one of the most promising options for VOC elimination, since the reaction operates at temperatures much lower than those required for thermal incineration. Catalysts based on supported noble metal are known as the most effective for this type of application, but since their manufacturing cost is high and their resistance to poisoning is low, efforts are made in our laboratory to develop transition metal based catalysts with high catalytic activity.

In this project, new supported transition metal nano-oxide catalysts will be studied. The role of the support on the catalytic performances will be particularly considered. Indeed, redox properties of active phases (MnOx, CoOx…) can be exalted using supports with high oxygen mobility.

The study will be divided in three parts: (i) the synthesis of the new supported catalysts, (ii) their physico-chemical characterization and (iii) the evaluation of their catalytic performances in VOC total oxidation

Different techniques will be used such as: gas phase chromatography, X-ray photoelectron spectroscopy, differential and gravimetric thermal analyses, X-ray diffraction, impedance spectroscopy…

The project would last for 3 to 8 months, between November and july.

Keywords: VOC catalytic oxidation, catalyst characterization by spectroscopic measurement, redox properties, oxygen mobility.

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