EUROPEAN SYNCHROTRON RADIATION FACILITY

ESRF

ESRF	**Experiment title:** Operando XAS study of composite Pt/Al_2O_3+Fe-ZSM-5 NH_3 slip catalysts	**Experiment number**: CH-5741
Beamline: BM23	**Date of experiment**: from: 24/02/2021 to: 01/03/2021	**Date of report**:
Shifts: 15	**Local contact(s)**: Cesare Atzori	*Received at ESRF:*

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Report:

The proposal originally aimed at investigating Pt- and Pt/Fe-based catalysts for the selective oxidation of NH_3 to N_2 under *operando* conditions. Nonetheless, the safety limitations imposed due to the partial user operation during the Sars-CoV-2 pandemic prevented the usage of the concentrated NH_3 needed for the experiment. In agreement with the Safety group and the beamline scientists, we thus focused on Pt and PtPd based catalysts for CO and/or NO oxidation. In particular we were interested to investigate the impact of different noble metal preparation routes on the catalytic activity. The tests were conducted in a capillary microreactor heated by a hot gas blower (Oxford). Reactive gases were dosed with mass flow-controllers, using the dedicated gas dosing unit available at BM23. The reaction progress was monitored at the outlet of the reactor using a mass spectrometer (Pfeiffer Vacuum) and a NDIR instrument (ABB). The 2% NM/CeO_2 catalysts were analysed under model CO and NO oxidation reaction conditions, to a maximal temperature of 500°C. The effect of reductive pre-treatment was also assessed.

Preliminary results indicate a clear impact of the NPs synthesis method, given a similar particle size, on the catalytic and electronic behaviour of the noble metal species. In particular for the bimetallic catalysts a correlation with the alloying degree of the nanoparticles was observed. The obtained data are currently being analysed in detail at KIT and will be included in future publications.