

Experiment Report Form



	Experiment title: XAS investigations to understand the aging behavior of Pd- and Rh-based TWC	Experiment number: CH-5396
Beamline: BM25A	Date of experiment: from: 04.06.2018 to: 09.06.2018	Date of report: 14.12.2019
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Report:

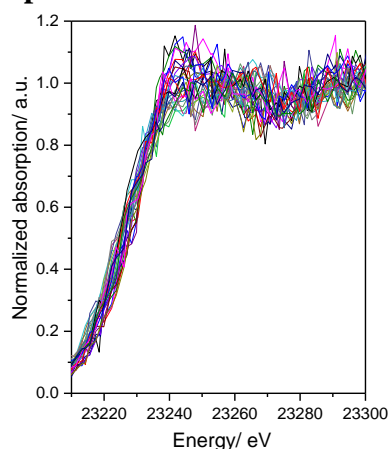


Figure 1. Rh K near edge (XANES) spectra of the 1 wt. % Rh/Ce_xZr_yO_z catalyst under stoichiometric three-way catalytic reaction condition, recorded in fluorescence mode

The three-way catalysts (TWC) are the most known exhaust gas aftertreatment systems to reduce the emissions of CO, HCs and NO_x of gasoline engine vehicles, when operated at conditions close to stoichiometric air-to-fuel ratios. They contain Pt, Pd, and Rh as main components supported on γ -Al₂O₃ and Ce_xZr_yO_z, the later also acting as an oxygen buffer. However, the remaining challenges for TWCs are chemical and thermal deactivation. With this study intended to investigate the behaviour of Rh and Pd in model three-way catalysts during light-off/light-out tests and thermal aging. The tests were conducted in a capillary microreactor heated by a hot gas blower (Oxford). The reaction products were continuously monitored with a FTIR and a MS. In general, the results revealed the evolution of Rh species as a function of temperature. However, for catalysts supported on Ce_xZr_yO_z we had significant difficulties with the quality of the obtained fluorescence spectra (very low S/N ratio), as illustrated in Fig.1. The obtained XANES results only show trends in oxidation state variation since we had to average a large

number of spectra in order to obtain a reasonable outcome.