STUDY OF STABILITY OF THE PLATINUM AND PLATINUM ALLOY CATALYST FOR PEM FUEL CELLS

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Necessity of using platinum metals based catalysts represents one of the main drawbacks of the proton exchange membrane fuel cells (PEM FCs). Reduction of platinum loading thus represents necessity in order to make PEM FC technology economically competitive. One approach to the platinum loading reduction represents use of the alloys with high catalytic activity. Part of the platinum can be replaced by other platinum metals (palladium, ruthenium, iridium) or non-noble metals (cobalt, nickel, iron, copper). Lanthanoides represent new group of metals representing possible replacement of platinum in catalyst structure. Main advantage of platinum and other platinum metals represent their high stability in an aggressive environment of PEM FC. Non-platinum metals can be, on the other hand, selectively dissolved during operation FC operation due to their lover chemical stability. Required lifetime of PEMFC for automotive applications is 6000 hrs for passenger cars and 25000 hrs for trucks. Catalysts represents one of the critical element of stack lifetime. It is thus important to understand impact of the Pt catalyst alloying on the FC lifetime.

The target of this study is to provide deeper insight into mechanisms of degradation of catalysts based on pure platinum, platinum cobalt and platinum cerium alloys. In the first step, the catalysts being subject of this study were studied by classical electroanalytical techniques on rotation disc electrode. In second step, their stability in the laboratory PEM FC was analysed. The changes catalysts undergo were analysed post-mortem by a range of techniques, like XRD and SEM.

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