s5.m2.o5 **Characterization of binary and ternary fuel cell catalysts by XRD and TEM.** C. Roth, N. Martz, H. Fuess. *Institute for Materials Science, Darmstadt University of Technology, Petersenstr. 23, D-64287 Darmstadt*
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Fuel cells seem to be one of the most promising routes towards renewable and environmentally acceptable energy technologies. Nevertheless there are still many problems left to be solved until the challenge of true commercialization could be accepted.

State of the art catalyst for the PEM fuel cell anode is a highly-dispersed PtRu (1:1) catalyst supported on carbon. Ruthenium additions should provide for a lower extent of CO poisoning of the electrocatalytic active Pt sites when reformate is used as anode feed gas[1].

Up to now only few investigations deal with the physico-chemical characterization of the fuel cell catalysts in use[2], whereas electrochemical techniques belong to the routine analytic tools in catalyst research.

Our intention is to study the structure and nanomorphology of both conventional and new anode catalyst formulations by a combination of spectroscopic and diffraction methods, e.g. RFA, XPS, XRD and TEM[3]. A distinct connection between structure and electrocatalytic activity is to be proposed by comparison of the results in spectroscopy, diffraction and electrochemical characterization.

Various PtRu/C catalysts were synthesized by either a conventional reduction method or a colloidal technique and then treated at elevated temperatures in natural air or under nitrogen flow. The powder diffraction data obtained shows significant differences stressing the fact that synthesis plays an important role in catalyst research. The catalysts synthesized by a conventional reduction method exhibit particle sizes within 10 nm forming agglomerates, while the colloid catalyst consists of highly-dispersed nanocrystals with sizes < 2nm. Heat treatment at 500 °C under nitrogen flow leads to segregation of metallic Ru particles indicating that the catalysts are not true alloys.

The differences in catalyst structure and nanomorphology depending on the chosen synthesis and temperature treatment are shown in the XRD and TEM[4] results to be presented on this conference.

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