

Title: Study of 3-phase catalytic layers for polymer electrolyte fuel cells and electrolyzers

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Abstract: The diploma thesis focuses on the study of catalytic layers for Proton Exchange Membrane Fuel Cells (PEMFC) or electrolyzers based on the mixture of platinum and cerium oxide. These layers are prepared by using magnetron sputtering, their properties are studied depending on the deposition parameters or the choice of the substrate by using SEM, AFM, XPS and then tested as an anode in the fuel cell. In addition to the morphology of the catalytic layers, it has been shown that the dispersion of very small nanoparticles of the catalyst with a size of 1-2 nm has a great effect on PEMFC performance. Most of the prepared samples gave maximal and maximal specific performance much higher than the state of art values published for Pt-CeO_x system. By studying properties of the layers used as the anode catalysts, this work contributes to the understanding of PEMFC fuel cell behavior and, consequently, to its potential commercialization.

Keywords: Fuel cell, cerium oxide, platinum, catalyst, magnetron sputtering

