

**Supervisor`s report of doctoral thesis "Electron Microscopy and Spectroscopy Study of Nanostructured Thin Film Catalysts for Micro-Fuel Cell Application" proposed by
Mgr. Jaroslava Lavková.**

Ms. Jaroslava Lavková developed her thesis "Electron Microscopy and Spectroscopy Study of Nanostructured Thin Film Catalysts for Micro-Fuel Cell Application" under joint doctoral studies at Department of Surface and Plasma MFF UK in Prague and at Laboratoire Interdisciplinaire Carnot de Bourgogne, Ecole Doctoral Carnot-Pasteur Université de Bourgogne under the dual leadership of me and Dr. Valerie Potin.

The doctoral thesis deals with the study of real catalytic systems in the form of very thin layers of cerium oxide doped with a small amount of platinum prepared by magnetron sputtering. Experimental work was based primarily on the use of electron microscopic methods, which together with used spectroscopic methods allow correlate structural and morphological parameters of prepared catalyst layers with their composition and properties for use in hydrogen fuel cells. The study was based on an extensive series of samples of cerium oxide sputtered thin films, both undoped and doped with a small amount of platinum, deposited on various types of carbon layers supported on a silicon substrate in order to understand the effect of the parameters of preparation on the growth of the layers, their morphology, structure and composition. The obtained results show that suitable combination of deposition conditions together with a type of carbon support allows to tune the morphology of the catalyst and to obtain a very porous structure with a large surface. Suitable parameters for preparing Pt-CeO_x layers were then used in the preparation of the catalyst layers on commercial carbon substrate, called GDL, and successfully tested in a hydrogen fuel cell. Thus author of the thesis made a significant contribution to understanding the processes occurring during sputter deposition of the active layer on the carbon substrates suitable for use as electrode materials for fuel cells.

During solving her doctoral thesis Mgr. Jaroslava Lavková clearly demonstrated that she is capable of independent scientific work, she can work effectively with the results, analyze them in context, interpret them, present and publish. Finally, it is necessary to mention mastering complex experimental techniques of transmission electron microscopy with associated spectroscopic methods EELS and EDX.

Authorship or co-author of 10 publications in international peer-reviewed journals and administration of doctoral thesis, which I consider as very successful, in less than four years is itself a testament of the quality her work.

In conclusion, the submitted work meet the defined objectives and criteria required for a doctoral thesis. I suggest, therefore, accept the work of Mgr. Jaroslava Lavková for the defense.

Prague, 15th May 2016

Doc. Mgr. Iva Matolínová, Dr.