

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University

Applicant**Mgr. Markéta Holá, Ph.D.****Habilitation thesis**

Laser-matter interaction as a key process for sampling by laser ablation

Reviewer**doc. Ing. David Milde, Ph.D.****Reviewer's home unit,
institution**

Department of Analytical Chemistry, Faculty of Science, Palacky University Olomouc, Czech Republic

The submitted habilitation thesis is a broad selection of 12 publications and maps Dr. Holá's scientific development from 2006. Her research has been focused on the challenging issue of interaction between laser and mainly geological and metallic samples being studied by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Dr. Holá suitably presents the outcome of her research in combination with results published by others, thus placing them in a wider scientific context. From the thesis, one can see a balanced combination of her obtained theoretical knowledge, suitably chosen applications, as well as a comprehensive discussion of results obtained from a range of instrumental techniques, not only ICP-MS. The first part addresses several appropriate procedures implemented for laser-sample interaction studies. Here, a complex issue playing a key role in obtaining reliable analytical results by LA-ICP-MS is clearly presented, and the contribution of the habilitant, especially to the detailed characterization of the generated aerosol, is highlighted. The second part focuses on parameters that affect the process of laser ablation, and particular conclusions on the influence of individual parameters are presented with sophisticated insight.

The results, which are summarized in the reviewed habilitation thesis, bring new and original findings and provide valuable insight into the challenging hyphenation of laser ablation and ICP-MS. Dr. Holá's habilitation thesis is of a high professional standard, deals with current issues in surface elemental analysis, and brings high-quality insight into current knowledge in the field. The thesis is formally very carefully prepared, well structured, and provides an overview of the techniques and a summary of the state of the art and new developments in the several fields of research.

I believe that the habilitant has proved that she is a knowledgeable analytical chemist by her honest work and results (currently 42 impacted publications, largely in Q1 and Q2 journals on WoS). Thanks to the acquired knowledge, she is able to creatively solve difficult problems in both scientific and everyday analytical practice. A good citation record confirms the topicality and importance of the published results.

Dr. Holá actively participates in international and national conferences and workshops. At several scientific meetings, I had the opportunity to listen to her contributions to the scientific programme and she always presented Masaryk University very well. She also participated in the organisation of many conferences and courses held by the Spectroscopic Society of Johannes Marcus Marci.

The applicant has been involved in a wide range of teaching activities for bachelor's, master's and doctoral students. The number of supervised and successfully defended student's theses (25) also shows her good pedagogical skills.

Reviewer's questions for the habilitation thesis defence:

1. In chapter 3.1 you mention $\lambda = 193 \text{ nm}$ as a higher harmonic frequency of the Nd:YAG laser. Which higher harmonic frequency is it?
2. Despite the fact that quantitative analysis by LA-ICP-MS is not covered in detail in the thesis, I would like to pose a question regarding calibration strategies. Do you see any universal calibration strategy for reliable quantitative analysis by LA-ICP-MS?

Conclusion

The habilitation thesis entitled "Laser-matter interaction as a key process for sampling by laser ablation" by Mgr. Markéta Holá, Ph.D. **fulfils** requirements expected of a habilitation thesis in field of Analytical Chemistry.

On the basis of the submitted habilitation thesis, the overview of teaching activities at the Faculty of Science, Masaryk University, and the contribution to scientific activities, I gladly recommend **accepting the thesis for habilitation** and, after successful defence to award Mgr. Markéta Holá, Ph.D. the title "Associate Professor" in the field of Analytical Chemistry.

Date: 23rd August 2024

Signature: