

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University

Applicant

Mgr. Ondřej Zobač, Ph.D.

Habilitation thesis

Experimental and Theoretical Study of Phase Diagrams

Reviewer

prof. Ing. Bedřich Smetana, Ph.D.

Reviewer's home unit, institution

VSB-Technical University of Ostrava, Faculty of Materials Science and Technology, Department of Chemistry and Physico-Chemical Processes

The submitted habilitation thesis is focused on the experimental and theoretical (CALPHAD method) study of phase diagrams of metallic materials, specifically binary and ternary metallic systems. The work falls within the field of the habilitation procedure "Physical Chemistry" at the Faculty of Science of MUNI. The thesis is aimed at the study of systems whose equilibrium states are not/were not known or described, or for which contradictions appear in the literature.

The submitted work represents a commented, systematically and logically structured overview of the candidate's research in the given field, supported by high-quality publications indexed in the WOS and SCOPUS databases with corresponding citation impact.

In the first part of the thesis, the candidate deals with the experimental study of materials, precise preparation of samples using appropriate procedures, and subsequent characterization of the prepared material using DTA, DSC, SEM, XRD, and WDX methods. In the second part, the applicant summarizes the approaches and concept of the semi-empirical CALPHAD method and its application in combination with experimental data and ab initio data (heat capacities, enthalpies of formation of phases, etc.).

The thesis is conventionally structured and comments on the most significant works of the candidate (high-quality outputs summarized in publications with impact factor). The applicant is the author of 33 articles in scientific journals and five chapters in monographs, with twelve works discussed in detail in the habilitation thesis. For these twelve works, the author specifies his contribution to the studied areas, which, among other things, demonstrates his significant scientific research involvement. Although these are mostly multi-author works, as is typical in this field, Mgr. Ondřej Zobač, Ph.D., made essential contributions to all of them. In many publications, he is listed as the main/first author as well as the corresponding author. Given that all published works underwent the usual rigorous peer-review process prior to publication, it would not be purposeful to evaluate them again in detail. The scientific quality of all articles presented in the habilitation thesis is unquestionable.

Within the scope of O. Zobač's activities, valuable information, data, and knowledge in the field of phase equilibria of many metallic systems (especially binary and ternary systems) have been obtained during his professional career. These findings belong to the fundamental research domain with significant application potential for the development, production, and

thermal and mechanical processing of metallic alloys (for example, in the development of duralumin alloys or thermoelectric materials).

Reviewer's questions for the habilitation thesis defence:

- 1) I would like to ask the candidate for his opinion: In which direction(s) will future activities (both yours and global trends) in the field of equilibrium studies develop over approximately the next five years?
- 2) Could the impact/contribution of the candidate's experimental and theoretical work be quantified, how could be quantified, particularly in connection with the application of the acquired knowledge in practical applications? Provide a commentary, please.

Conclusion

I consider the submitted habilitation thesis/commentary on the publication outputs and the publication outputs themselves to be of very high quality. Through his work and publication activity, the author has demonstrated that he has developed a coherent body of scientific work and is a recognized expert both nationally and internationally.

The habilitation thesis entitled "Experimental and Theoretical Study of Phase Diagrams" by Mgr. Ondřej Zobač, Ph.D. **fulfils** requirements expected of a habilitation thesis in the field of Physical chemistry.

The submitted habilitation thesis of Mgr. Ondřej Zobač, Ph.D., in my opinion, meets the prescribed requirements (formal, content-related, and qualitative) imposed on a habilitation thesis, and **I therefore recommend that it be accepted as a basis for the habilitation procedure.**

Date: 27. 2. 2026

Signature: