

**Department of Chemical Physics and Optics**

To whom it may concern.

Reviewer's report on the Habilitation thesis of Ing. M. Nikl, CSc.

The submitted thesis entitled *Modern Fast Scintillation Materials Based on the Doped Complex Oxides* comprises a collection of 23 papers selected from the publications co-authored by Ing. Nikl during the past 15 years and an introductory text (about 30 pages). After a short lead-in to the principles of operation of scintillators the introductory text presents a concise review of global progress in the research of single crystal scintillators based on complex oxide compounds. It is divided into three sections, namely (1) Aluminium and multicomponent garnet scintillators, (2) Aluminium perovskite scintillators, and (3) Ortho and pyrosilicate scintillators. The text is concluded by the General discussion and conclusions. The author describes in detail the properties of each material family with accent on the light emission properties, scintillation response times and unwanted effects of charge carrier trapping. In the final part the author outlines explicitly two present-day strategies used to improve scintillator performance, namely the band-gap engineering and control of material defects.

In my opinion, Ing. Nikl's text is an excellent and very concise review of the work done on single crystal scintillators, demonstrating at the same time the author's very important contribution to the global research. However, the habilitation being generally understood as a pedagogical degree, the introductory part of the thesis could be expected to present an extensive overview of the subject in a broader context accessible even to the reader outside the field. I would have expected the author to have paid more attention to this aspect of the thesis. On the other hand, the scientific content of the introductory text and of the attached papers is sound and very interesting. Personally, I enjoyed reading the parts related to the results on trap engineering based on deep understanding of related

microscopic processes. During the defence of the thesis, there might be an opportunity for a more detailed discussion of the processes affecting the dynamics of trapped carriers.

Ing. Nikl, CSc., has an outstanding publication record of 588 papers published in impacted international journals which have more than 6300 citations in literature. His Hirsch number $H=45$. His publications as well as the thesis are a clear evidence of the world-wide impact of the author's contribution to the progress of the scintillator research.

In conclusion, the thesis submitted by Ing. M. Nikl, CSc., is of outstanding quality. His overall scientific performance resulting in a significant contribution to the applied research of scintillators indicates that he undoubtedly fulfils the scientific criteria for promotion to the rank of a full Professor rather than Associated Professor. It gives me great pleasure to recommend strongly his promotion to Associated Professor.

In Prague, April 15, 2015

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