

Opponent's Report on Habilitation Thesis

Author: Mgr. **Martin Motola, PhD.**

Title: *Anodic TiO₂ nanotube layers: past accomplishments and future perspectives*

Section: Inorganic Chemistry

University: Faculty of Natural Sciences, Comenius University Bratislava

The subject of reviewed habilitation thesis is focused on TiO₂ nanotube layers, which are considered as an excellent material for photocatalysis including hydrogen production dye-sensitized solar cells, ion-insertion batteries, and degradation of (primarily) organic pollutants in both aqueous and gaseous phase. Presented habilitation work summarizes the scientific results in the field of TNT layers prepared via electrochemical anodic oxidation, their synthesis, modification, and photoelectrochemical applications in degradation of micropollutants like caffeine and methylene blue.

Short Conclusion is in the end of the text part of the thesis together with the List of references (35 cited publications).

The habilitation thesis contains 17 peer-reviewed publications, the most of them are in rank Q1-Q2 with high Impact Factor, so there is no reason for me to comment them.

Due to a very high standard of the habilitation thesis, I have only a few questions/comments:

- Page 20: When anodizing larger surfaces, e.g. on aluminium, the electrolyte is heated up, did you also solve this problem in your experimental setup during Ti oxidation?
- Page 23: I assume you were using the dc polarization of the system during anodic oxidation. Have you tried other types of electrode polarization, for example pulse polarization?
- Page 33: New type of electrolyte based on nitrate electrolyte yields approximately 6 times lower production of HO• radicals. Is it promising for photoelectrochemical and photochemical applications?
- Page 33: Did you try photocatalytic degradation of caffeine also in the second case?

The habilitation thesis also contains small number of formal errors like:

All chapters: Use brackets when variable is in range representation: (1 - 5) cm², then unit is valid for both numbers (see page 20, 21, 26, 27).

Page 14: Fig.2 To(A1).... should beTi(A1)

Page 17: use “hard” space in wavelength definition, do not leave $\lambda =$ in the end of the line

This habilitation thesis gives clear evidence that the candidate is able to work efficiently in research team on a very high scientific level, and thus be a very valuable member of the research team.

Submitted habilitation thesis of Mgr. Martin Motola, PhD. fulfils all requirements given in the official documents on habilitation thesis.

From the above reasons I recommend the Habilitation Committee

to accept

the habilitation thesis of Mgr. Martin Motola, PhD. for further steps and after successful defence I suggest to confer a degree “Associate Professor” in the field “Inorganic Chemistry”.

Bratislava, 20/03/2024

prof. Ing. Ján Híveš, PhD.