

Supervisor's opinion on the Ph.D. thesis
**“Preparation and characterization of nanocomposite thin films
for sensors of organic solvent vapours”**

written by

Rostislav Slobodian

submitted to the

Tomas Bata University in Zlín

Ing. Rostislav Slobodian studied the Ph.D. programme 'Nanotechnology and Advanced Materials' at Tomas Bata University in Zlín, Czech Republic. Within his studies, he has fulfilled all duties connected with the study programme and successfully passed the state doctoral exam. His dissertation work is focused on the preparation and characterisation of nanocomposite-based sensors for volatile organic compounds. The prepared sensors provided significant responses to ethanol, acetone, toluene, and heptane as representative hydrophilic and hydrophobic compounds that differ in polarity. The first studies were performed using soluble thermoplastic elastomers and carbon nanotubes. His work was hard and required many trials and errors. Nevertheless, his endurance overcame the problems, and all the gathered experience allowed him to prepare sensors based on the styrene-butadiene-styrene block copolymer and graphene as the filler. These sensors provide significant response and selectivity previously unseen for nanocomposites with carbonaceous nanofillers. It is the combination of the filler with the suitable matrix which imparts excellent properties to the sensors. Moreover, the response mechanism was clarified and interpreted in terms of the Hansen solubility parameter approach, which enables us to expect a new class of sensors tailored using this simple yet effective principle.

The dissertation was submitted as a monograph. However, its core findings were embodied in two publications in impacted journals, the first in *Sensors* and the second in *Polymers*, where Rostislav contributed as the co-author and the first author, respectively. Rostislav is also a co-author of another paper in the journal *Sensors and Actuators B: Chemical*.

Rostislav Slobodian presented his results at three international and one national conference. He also spent one month abroad on a project in cooperation with IKEA in Älmhult (Sweden) and took part in several significant trainings abroad; besides that, he was involved in many international cooperations and projects. Rostislav studied in a combined form for the whole period of his studies. It must be noted that it is challenging to fulfil this duty when one studies in the combined form and has everyday duties in his job. These stays, training courses, and cooperation project participations were allowed by his employers, and my thanks as the supervisor go to them.

To provide a complete picture, I also confirm that no plagiarism was indicated by similarity analysis in anti-plagiarism text-checking systems. If there are any parts indicated by similarity analysis, it must be emphasised that such scores account for the papers with Rostislav's own works and results. All indicated texts or figures are appropriately cited.

To summarise, during his study at TBU in Zlín, Rostislav Slobodian demonstrated sufficient diligence, knowledge, and effort necessary for the successful fulfilment of the studied Ph.D. programme. With regard to these facts and according to my opinion, the submitted dissertation work is well conceived. I recommend it to be defended, and upon successful defence, Rostislav Slobodian will be awarded the Doctor of Philosophy (Ph.D.) degree.

Zlín 15th March 2024

prof. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

Supervisor