

**Report on PhD thesis by Ganna Urgur entitled
„Filtration of air and liquids using active substances“**

The subject of this thesis is related to the research of a very interesting and important process of gas and water purification. The thesis is focused on development and testing of composite filtration materials based on nanofibres, especially for antibacterial purification of air and water and for removing nitrogen oxides and carbon monoxide from air. Different nano and microparticle oxides having catalytic and/or antimicrobial properties and different methods how to incorporate them to the composite filtration materials were studied. From this point of view the subject of thesis appears to be very topical and the results obtained by Ganna Urgur are likely to have a stimulating impact on the next research and development of filtration materials.

The thesis is very voluminous as it consists of two separate parts, actually each of them represents an independent thesis. Both parts have been properly divided into standard chapters. The Theoretical parts, based on up-to-date references, comprise information about fundamentals and state of art in the field of studied filtration and purification processes. The experimental parts comprise essential information on materials, methods, processes and techniques that have been used, focused mainly on techniques of nano fibrous composite filtration materials preparation and methods of their testing.

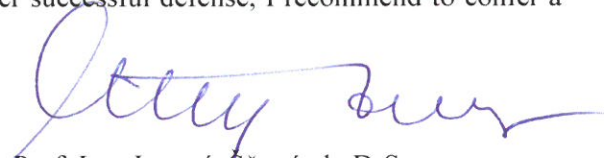
Both the discussions of obtained results illustrate a very broad scope of the defendant. I am not acquainted with textile techniques and technologies in detail, thus, I don't feel like to discuss the very details of the experimental work. I assess the thesis as well organized and well done, description and discussion of experiments has been comprehensible. I would like to stress, that reading the thesis was interesting and stimulating. The findings concerning homogeneous distribution of CuO microparticles in PU nanofibres and promising antibacterial activity of composite filters on this base as well as promising achievements in catalytic CO oxidation seem to be very important. As required, the results have been published in two international journals, both papers have been already cited.

My question: how far is the utilization of such filters in an industrial scale?

Conclusion

In conclusion, it can be stated that the subject of thesis is highly relevant and that the candidate achieved the aim using modern experimental and analytical methods. By choosing the approach and method of elaboration Ms. Ganna Urgur manifested her ability of independent a creative scientific work. By a successful solution of a research problem, she brought new findings and showed a good grasp of scientific methods of work. Because Ms. Ganna Urgur thus fulfilled the appropriate conditions, I recommend her thesis for defending. After successful defense, I recommend to confer a scientific degree of PhD upon the candidate.

2017-05-09


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Review of the doctoral dissertation
„Filtration of air and liquids using active substances“
by Ing. Ganna Urgur

The submitted dissertation is focused on the preparation and characterization of the filtration materials for water and air purification. It introduces a highly contributive topic in terms of both fundamental research and potential practical use.

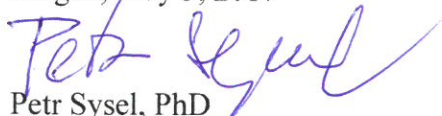
The main aim of this multidisciplinary dissertation was the preparation of the nanofibrous polymeric materials containing metallic modifiers and their testing as both antibacterial and air filters. The experiments are described comprehensibly with the possibility to reproduce them. Although some procedures did not yield the expected, favourable findings I think that G. Urgur achieved the main goals in her dissertation and she acquired valuable experimental results and applicable knowledge.

Nevertheless, I believe there are still several points in the dissertation, which G. Urgur should give her attention to during the defence:

- (1) The reasons for choosing the polyurethane and polyamide fibrous “matrices” should be more clearly specified.
- (2) The basic characteristics (including a molar mass) of these polymeric matrices should be presented in more detail.
- (3) If a nanoadditive concentration of 5 – 12 wt% was used, an additive aggregation in the final products was observed. Have you tried to use a lower concentration (e.g. about 1 wt%) of these additives?
- (4) The rather different voltage was used for the electrospinning from the rod spinner (27 kV) and the roller spinning method (67 kV). Why?
- (5) It is appreciated that the potential toxicity of nanoparticles and nanofibres has been taken into account. Did you take any special precautions to deal with them?
- (6) Would it be possible to use the polymer melt as the starting materials (instead of a polymer solution) for any of your experiments?
- (7) Two publications (full papers) based on the results of this dissertation have already been issued, and two more manuscripts are under review. What is their current status?
- (8) The formal level of this dissertation is decent. However, the pronouns “I”, “me” and “my” should be used instead “we”, “us” and “our”.
- (9) The graphical level of this dissertation is fairly good. Nevertheless, the tables together with their headings should occupy the same page (e.g. Table 11 (pages 57 and 58)).

I recommend to accept this doctoral dissertation of Ing. Ganna Urgur for defence.

Prague, May 3, 2017



Petr Sysel, PhD

Professor

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