

## Opponent report on habilitation thesis of MSc. Fatma Yalcinkaya, Ph.D.

### “ One-dimensional nanofibers: Application in membrane technology”

The habilitation thesis is a compilation of 12 published papers authored or co-authored by the candidate, preceded by short overview mainly devoted to electrospun materials for membrane technology. The articles in the main text do not indicate the author's share in the individual articles, but it should be noted that: i) she is the only author once; ii) she is the correspondent author seven times and iii) other articles are more collective. However, Dr. Yalcinkaya is the author of more than 12 professional papers related to electrospinning in general. The thesis presents 35 WoS impacted journals; 6 other articles; 23 international conference papers; 2 patents; 3 book chapters etc.

Usually, a commentary on a set of works begins with an evaluation of the state of knowledge in a relevant area, followed by a brief evaluation of the results obtained by the author of the habilitation thesis in the area. This division is indicated in the work, but in the text it is not always clear to separate the work of others from the author's own work and contribution. I have further remarks on the main text of the thesis:

- I see a significant shortcoming of this habilitation thesis, which is also to prove the pedagogical competence of the author, in the use of basic statements concerning, for example, introduction to nanotechnologies or production of nanofibers or membrane technologies without proper citations of carefully selected professional literature. The statements used in the introductory paragraphs introducing the reader to the subject matter must be well thought out, not misleading and carefully cited, which lags slightly here.
- The main text of the thesis focuses on the description of a device called roller electrospinning, but it is a technology surpassed by more than 10 years. This is also evident from the fact that most of the articles presented in the main part of the habilitation thesis use a newer principle based on static wire spinning electrode. In both cases, of course, these are the needleless technologies used in Elmarco machines called Nanospider™. Roller electrospinning was described by the author in her doctoral thesis, but it is a pity that she did not take the opportunity to compare the first and second generation Nanospider™ devices and did not describe the difference between them, which lies mainly in the geometry of the spinning electrode in its curvature.
- The part devoted to the influence of material parameters (chapter 2.1.2.1) too generalized the problem, which is very complex and can be very different for different used materials. Complete picture about the problem cannot be shown only at one particular material conditions. But as a report about this particular material conditions it is valuable information.
- In the history of electrospinning (chapter 2.2), the patents of Cooley and Morton from 1900 and 1902 should not be neglected, even if they were not industrial devices.
- The list of key players / manufacturers in the field of nanofibers lacks references to relevant literature or world authority that could validated such a list.
- References to the literature are completely missing in the tables of examples, for example Table 3.2
- There is written in Chapter 3.6 that “more details related to the electrospinning process and mass production has been given in Chapter 2”, but there is nothing about current equipment for industrial or mass production or examples of products, etc.
- There is mentioned several times in the main text that nanofiber layers have a porosity of more than 80%, but nowhere is there a reference to the literature, calculation or other specific measurements.





- Furthermore, general statements that are not substantiated by the literature appear again in the work, such as in Table 3.3. "Almost all spinnable polymers hydrophobic". The question also can be if the polymers are hydrophobic or electrospun material from these polymer is hydrophobic?
- There is not explained how the production cost (from author laboratory) was calculated.
- Chapter 3.6.1.2 presents some of the most commonly used techniques for the characterization of nanofiber membranes, but the question remains whether the characterization procedures used to evaluate membranes are also used appropriately and correctly in the professional literature. This is, for example, the evaluation of SEM image for pore shape or pore size analysis. There is no author's critical assessment of the selection of suitable test methods.
- Figure 3.7, graph axis descriptions are missing.

The main text of the thesis is rather general and thematically not completely targeted, often without references to relevant literature. However, the presented articles published in very well-rated journals (relatively high impact factors) and the citation of the author's articles are proof of the quality of the author's scientific work. The author's publishing activities show that she is very capable of finding interesting topics in the research area she is engaged in and that she is able to lead a team and be a valid member of research teams. Despite my complaints about the main text of this habilitation thesis, it is clear that the author is above standard in publishing activities, also with regard to the number of points in the category of scientific research activity and activities recognized by the scientific community according to the habilitation proceedings.

The topic of membrane technologies with a focus on electrospinning is certainly a current topic and very widely studied worldwide. The Technical University of Liberec offers itself for this scientific focus, as it has many experts in all aspects of the topic - electrospinning; membrane testing; surface treatments; special analyses, etc. However, the author did not stop at connecting the scientific community in her topic within the TUL, but also with a number of her own established collaborations abroad.

The habilitation thesis is to prove the scientific and pedagogical abilities of its author. Scientific abilities were undoubtedly proven in this habilitation thesis, but pedagogical abilities were not, in my opinion, clearly demonstrated. At the same time, while studying the Materials for the habilitation procedure (qualitative evaluation), which Dr. Yalcinkaya filled in, there is obvious that she started teaching in full only in school year 2019-20. According to the STAG system, it seems that the established subject of doctoral studies will not be taught until the school year 2021-22, but as stated in the author's documents, the first two students already study.

I also watched an instructional film. Unfortunately, I must state that each of us university educators had to make dozens of such two-minute videos since Spring 2020, with appropriate comments, additional texts, interactive online teaching supplements, tests, etc. This video lacks communication with the student from a pedagogical point of view, does not explain individual steps, the layman is not clear what he sees in the video, does not offer the possibility of feedback, etc. This is probably due to the fact that the video is supposed to be linked to the lectures that are available at the *elearning*, but it is not possible for me to watch them, because my account is not linked to these subjects.

Despite almost ten years of experience (since the start of her doctoral studies in 2011 and since the start as Assistant Professor in 2016), Dr. Yalcinkaya supervised only one diploma student (graduated in 2019) as supervisor and three diploma students (all graduated in 2012) as co-supervisor (all graduated in 2012). Given the number of students studying in English at FT TUL and very good language-skilled students at FM TUL, I



consider this a very small number, because the supervising of bachelor's and master's theses is an important work and mission of academics, when they can pass on not only their knowledge and experience, but also moral values and motivation. However, according to the Documents for the habilitation procedure - quantitative evaluation, Dr. Yalcinkaya meets the recommended minimum for pedagogical activities at the habilitation procedure at FM TUL.

Dr. Yalcinkaya, in her scientific career to date, has focused on the interesting topic of electrospun materials for membrane technologies, and it is clear that her qualities are indisputable in the scientific field. At the same time, I very much appreciate her skills in creating international teams, connecting scientific institutions and scientific individuals. Her personal charisma creates a positive atmosphere, motivation and inspires intensive purposeful work, and I would recommend using it in the future, especially in pedagogical activities, to fulfil the academic title and thus to connect her educational and research role.

Despite all my above comments on the thesis, I believe that the submitted habilitation thesis of Dr. FATMA Yalcinkaya meets the requirements for the habilitation thesis and therefore **I recommend to accept it as a basis for further habilitation proceedings and for defence before the scientific council of FM TUL.**

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