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Opponent Report on Habilitation Thesis entitled
“ ONE-DIMENSIONAL NANOFIBERS: APPLICATION IN MEMBRANE
TECHNOLOGY”

by Dr Fatma Yalcinkaya, Technical University of Liberec

The habilitation thesis written by **Dr Fatma Yalçınkaya** was evaluated in terms of its format as an habilitation thesis, the scientific and technological importance of the subject of the thesis, the methodology followed, experimental and numerical tools to get some results and to analyse the data collected, comparative study done between the experimental-numerical findings and literature data, and most importantly its originality and contribution to science and technology.

The aim of this thesis is to investigate the design and development of nanofibers as microfiltration membranes with better fiber surface morphology, to improve their spinnability and enhance the properties of nanofiber web via an industrial-scale electrospinning device for various industrial applications such as water treatment. This habilitation thesis contains totally 173 pages and includes **4 Chapters**:

In **Introduction Part (Chapter 1)**, the main problems related with the utilization of nanofibers in filtration process was discussed based on the literature survey.

In **Chapter 2**, nanofiber technology in general was reviewed by mentioning about electrospinning process and parameters for the forming of the nanofiber web. In this chapter, the needle-free electrospinning system (roller electrospinning system) was also introduced.

Chapter 3 deals with nanofibrous membranes. General information about membrane technology was given in this chapter with such sub-titles as membrane morphology, membrane separation regime, polymeric membranes preparation methods, membrane structural properties, membrane pore structure, surface properties of membranes (hydrophilicity/hydrophobicity, surface charge, roughness), transport theory of membranes, concentration polarization, membrane fouling, antifouling mechanism of membrane, surface modification of synthetic polymeric membranes, nanofibers in membrane technology, preparation of nanofiber membranes, surface modification of nanofiber membranes and

current research on nanofiber membranes. Finally, some short explanations about disposal and recycling of nanofiber membranes were given in this chapter.

In **Chapter 4**, the selected publications were presented. Here, the scopes and novelities of each publications are also explained.

In **Part 5**, some conclusive remarks about the studies in this habilitation thesis were given.

This habilitation thesis generally defined the target problem very well in an understandable way, taking into consideration the information given in the literature. The experimental and theoretical analyses were performed by various methods which should be done for such research study. Scientific publications are most important proofs of the productivity and originality of an habilitation thesis. In this respect, the obtained results from this thesis were published to well recognized scientific journals with high impact factors. The candidate contributed to develop nanofiber using various water-insoluble polymers and their mixture for a better fiber surface morphology, improved spinnability, and enhanced properties as microfiltration membranes via an industrial-scale electrospinning device. The candidate showed that some of the polymers and their mixtures can be electrospun and used in industrial applications. It was clearly seen that this habilitation thesis was designed very well. According to my opinion, the candidate worked very hard to produce many useful data and exhibited the obtained experimental results in the thesis properly following a certain format. Some interpretations were made in order to explain clearly the facts of experimental findings. These are also compared with some other related published studies in the literature. Some of the publications are produced through the international collaborations of the candidate. This is also another positive impact of her research style as a universal scientist. As a conclusion, this habilitation thesis convincingly shows that Dr.Fatma Yalcinkaya has an outstanding understanding in the area of “**nanofibers and their applications in membrane technology**” for various purposes. **I recommend that this habilitation thesis can be accepted. The candidate is fully deserved to be promoted as Associate Professor** at your institution. I guess her contribution to the institution where she will get a position will be beneficial from different perspectives in the future.

Yours sincerely,

Prof.Dr. Nalan KABAY