A review of a Habilitation Thesis of Fatima Hassouna named Design of advanced functional polymeric materials from environmentally benign methodologies Oponent: Ass. Prof. Dagmar Merinska, Ph.D., Tomas Bata University in Zlin

The habilitation work submitted by Fatima Hassouma is composed of two main parts, a short theoretical introduction of main fields in the frame of plasticised PLA and the second part is a summary of all the significant articles where a candidate is a main author or the co-author again in the field of PLA preparation and the ways of plasticization. The work is written without formal mistakes or misprints and fulfil the requirements for this type of document.

The first part is logically divided into small chapters where the candidate briefly but clearly enough describes main domains of her work on the presented topic. The descriptions begin by the main features and properties of PLA, where the main problem of PLA – brittleness is discussed and completed by the next characters of this polymeric material, i.e. several types of degradation processes. This chapter is closed by the explanation of the necessity and ways of plasticization. Here the green type of it – cardanol derivatives is highlighted.

In the chapter 3 the next part of work topic of the candidate research is presented. The way of the improvement of PLA properties by nanofillers was used. Firstly, as a nanofiller modified cellulose crystals were studied. Next types of systems were based on graphene oxide and PANI sorbents.

Chapter 4 presents the imagination of the candidate about the future direction of her and her team research.

This introduction and theoretical part is based on 56 references including also the publication outputs of the candidate.

All topics summarised in the theoretical part are mentioned, studied, evaluated and discussed in the 25 publications summarised in the part B of Habilitation thesis. In my opinion, not all of them it was necessary to enclose to this thesis, because they are not fully bonded to the main topic of it. I mean the articles numbered as 1 - it is about pyridins, 10 and 13, which work with SBR. Nevertheless, the rest of them are logically related to the introduction part and it is clearly possible to see the effort to study deeply the problem of PLA and it modification by different ways of treatment. For me the results with maleated and acrylated PEG are very interesting in the way how these modifications were able to improve the PLA properties. Also the results in the frame of nanocomposite preparation bring a new possibilities of PLA properties modification.

This high amount of research it is not possible to reach by the solely work, it is clear that all of the publications were prepared by the team of researchers. Thus by this statement it is possible to confirm that the candidate is also able to lead the team of people, to create the tasks and to evaluate results in order to find the way of the next work.

Based on the all mentioned notices I can recommend the continue of the candidate habilitation process and this Habilitation thesis for the defence in front of the Scientific Board.

The questions to the candidate:

The mechanism of PLA degradation is known?

Could you describe in more details the miscibility of plasticizers for PLA? Is there also the problem of the migration?

Are there known also the other ways of plasticization?

PLA is the crystalline polymer, are its mechanical behaviour in the agreement i.e. with the behaviour of polypropylene?

Mentioned improvement of Tg is only about three or five grades, it is a significant movement?

In case of nanofiller based on cellulose – is there the influence of the viscosity or a molecular weight important?

In case of PANI systems the decrease of the crystalline structure was noticed, it is a problem?