

Review of the Doctoral Thesis

“Preparation and Properties of Materials for Intelligent Systems”

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Reviewer: Petr Filip
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In the presented doctoral thesis the applicant analyses the following topics:

- preparation of new materials based on oligomers of conducting polymers applicable as a dispersed phase in electrorheological (ER) fluids with the aim to enhance ER effect;
- usage of carbonization process representing a new method for preparation of electrically polarizable particles contained in ER fluids with the aim to enhance ER effect;
- rheological behaviour of the prepared ER fluids both in absence and presence of an external electric field.

The applicant has proved very good orientation in the studied topics and ability to contribute to this still developing area both in a series of scientific papers (up to now 9) published in the renowned international journals and in a series of conference contributions. This implies that top quality of his work has been evidenced by dozens of reviewers of various specializations from abroad.

Therefore, the aim of this review is not connected with already re-elaborated manuscripts resulting in the individual published papers (and some of them already repeatedly cited) but with the introductory part elucidating the topic of electrorheological liquids.

A reader can follow the individual introductory steps quite easily. However, for better presentation the following remarks should be taken into consideration:

- not attenuate language attention even in the Acknowledgement;
- more precise presentation of the very beginning of the onset of electrorheology;
- section Abstract: a term Bingham-like behaviour evokes the Bingham model, better formulation is required;

- section Abstract: every rheological topic is characterized by different forces entering the balance equations, in this case a mention about hydrodynamic forces seems to be inevitable;
- better terminological compactness should be applied, example: intelligent used in the Abstract, smart used in Chapter 1;
- first appearance of the Bingham model referred to [15, 16], later referred to [19], reference to [18] or any standard monograph on rheology seems to be more appropriate;
- rel. (1) is not valid for Newtonian fluids only;
- rel. (2) represents only one from many other possibilities, even for some concentration ranges is not applicable;
- rel. (2): a term intrinsic viscosity is not explained;
- the Herschel-Bulkley model is possible to apply but it does not correspond to reality;
- a characteristic feature of the Cho-Choi-Jhon model is in its approximate correspondence with the data, however, in predicting tendencies this model rather fails as its first derivative usually does not follow behaviour of experimental data;
- List of symbols and acronyms: rather illegible, acronyms should be separated from the symbols, the symbols should be arranged alphabetically including the corresponding units, Greek symbols at the end, some terms appearing in the text are missing;
- References: for better legibility the referred numbers as the only lines should be adjusted from the very left;
- final remark: at the beginning the Introductory Section should be based on more general topics (rheology, electricity, magnetism, etc.), then to present their touching points contributing to an introduction of electrorheology or magnetorheology, and consequently to point out concrete literature on these two disciplines. The literature cited should be referred in the same way.

In no way these comments lower an outstanding quality of the thesis presented that is written very carefully and clearly in good English. The thesis fulfils all the demands imposed to this work.

Prague, 30 May, 2016

Petr Filip

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