

Review of the Doctoral Thesis

“Reinforcing mechanisms of polymer matrix composites: Evaluation and modeling of matrix/dispersed phase interrelationship”

by Julian Niklas Rech

**Centre of Polymer Systems, Tomas Bata University in Zlín, Zlín, Czech Republic
University of Applied Sciences, Hochschule Bonn-Rhein-Sieg, Department of Natural
Sciences, Rheinbach, Germany**

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Reviewer: Petr Filip
Institute of Hydrodynamics, Czech Acad. Sci., Prague, Czech Republic

In the presented doctoral thesis the applicant concentrates on the mechanical behaviour of polymer matrix composites (polyamide 66 or poly(butylene terephthalate) reinforced with glass spherical beads or short glass fibres) with an emphasis on elastic and viscoelastic characterisation.

The submitted thesis is well-structured and easy to follow. The introductory part provides a complete list of techniques serving for a description of mechanical behaviour of polymer matrix composites, naturally followed by the results achieved during the Ph.D. study. Finally, the results are summarised in the section Conclusion including the contributions to science and practice.

In spite of clearness of presentation of the applied procedures, for better elucidation of the obtained results the following comments should be discussed:

- a composition of the reinforced composites is not very clear as the used spherical glass beads and fibres are not geometrically specified;
- in this context the introduced value of concentration (20 wt.%) as the upper bound for a correct finite element simulation using the elementary volume concept model is rather unclear as changes in geometrical characteristics of glass fillers can substantially change an interface area between the fillers and the polymer matrices;
- it is necessary to be careful with the cited literature as for instance the situation in understanding of the van der Waals forces at present strikingly differs from that in 1947;

- preciseness of the measured values strongly depends on accuracy of the experimental devices; the presented results should not exceed this inaccuracy in the orders;
- in this context it is also possible to question accuracy of the adjustable parameters in the fitting relations in Figures 36-38;
- there is also a discrepancy (caused probably by a producer) between the descriptions of AKROMID2 A3 GK 30 and AKROMID2 A3 GK 40, where the introduced data for w_F and v_F are mismatched.

The thesis is written very carefully with practically no misprints. The individual subtopics are well documented (also graphically) and explained. In no way the above comments lower a very good quality of the thesis presented.

According to my opinion the thesis fulfils all the demands imposed on this work. I recommend the Thesis in its present form to submit to the evaluation process and in the case of positive Ph.D. defence to grant the title Ph.D.



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Petr Filip

Institute of Hydrodynamics CAS, v. v. i.
Pod Patankou 5
160 00 Prague 6