

Supervisor evaluation of Ing. Bc. Jiří Drábek and his Ph.D. thesis

Student evaluation: Jiří Drábek began his Ph.D. study in September 2013 at Polymer Centre, Faculty of Technology, Tomas Bata University in Zlín. During his Ph.D. study, he was participating as valuable research team member on 4 applied rheology oriented basic research projects, namely GA16-05886S and GAP108/10/1325 provided by the Grant Agency of the Czech Republic and 2 internal projects IGA/FT/2016/007 and IGA/FT/2015/013 provided by UTB in Zlín. He was working independently, creatively, precisely and actively. His capability to perform different rheological measurements for polymer melts is excellent. During his Ph.D. study, he spent 8 months at Interdisciplinary Research Centre in Polymer Science & Technology, University of Bradford, England, United Kingdom together with Dr. Mike Martyn. At that place, he studied the flow behavior of low-viscosity polymers under conditions prevailing in the production of polymer nanofibers by using instrumented injection molding machine. He also performed experimental measurements on the melt blown pilot plant line at the Borealis Company in Linz, Austria, with the support of Joachim Fiebig. He was able to learn and apply in proper way a number of different rheological experimental techniques to reach all Ph.D. thesis aims. Jiří also received 'The Best Paper Award' from the Society of Plastic Engineers (Applied Rheology Division), Indianapolis, Indiana, USA for the paper entitled as: Evaluation of Branched Polypropylene Degradation by Using Different Constitutive Equations. He was also one of the key organization team member for four international conferences (Novel Trends in Rheology IV-VII) organized in 2011, 2013, 2015 and 2017 by FT UTB in Zlín. During his study, he has already published three research papers in the following impact factor research journals:

- *Polymers* (AIS₂₀₁₆ = 0.941, IF₂₀₁₆ = 3.364)
- *Polymer* (AIS₂₀₁₇ = 0.740, IF₂₀₁₇ = 3.483)
- *Journal of Non-Newtonian Fluid Mechanics* (AIS₂₀₁₇ = 0.769, IF₂₀₁₇ = 2.293)

Jiří Drábek has also showed ability to successfully present and defense his scientific work at different conferences before number of international and national experts. Till this date (December 4, 2018), the number of Jiří Drábek's publication records in the Scopus database is 8 (Author ID: 55670903300).

It can be stated that Jiří Drábek has demonstrated high independency, creativity and sufficient knowledge fulfilling the studied 'Chemistry and Materials Technology' Ph.D. study program.

Evaluation of Jiří Drábek's Ph.D. thesis entitled as 'Applied Rheology for Production of Polymeric Nanofibers': The Ph.D. thesis is predominantly focused on fundamental understanding of dynamics of polypropylene melts at the extremely high deformation rates occurring during production of polymer nanofibers via melt blown technology. The following findings can be considered as the breakthrough in the Polymer physics filed. First, polypropylene chains become fully disentangled at the secondary Newtonian plateau region occurring above shear rates of $2 \times 10^6 \text{ s}^{-1}$ does not matter whether they are linear or branched. Second, chain branching in PPs decreases the secondary Newtonian plateau due to decreased coil size and increased free volume availability. Finally, fiber diameter variation in the melt blown nonwovens is lower for branched polypropylenes in comparison with their linear counterparts. Obtained knowledge can directly be used in material, die design and process conditions optimization for stable production of polymeric nanofibers via melt blown technology. The Ph.D. thesis consists of three already published papers in prestigious journals (namely *Polymer*, *Journal of Non-Newtonian Fluid Mechanics*, *Polymers*) and one manuscripts submitted for the publication in the *Journal of Rheology*. This demonstrates high quality, novelty and originality of the research, which has been done by the Jiří Drábek in the studied research filed.

Plagiarism check: The Ph.D. thesis was verified by the plagiarism control and it is not a plagiarism.

Therefore, it is my pleasure to fully recommend Jiří Drábek and his Ph.D. thesis for the defense.

In Zlín, 4.12.2018



prof. Ing. Martin Zatloukal, Ph.D., DSc.