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Re: Ph.D. Thesis Review

Author: Ing. Michal Sedlačík, Tomas Bata University in Zlin  
Title: **Intelligent Fluids – Electro-Rheological (ER) and Magneto-Rheological (MR) Suspensions**

The work directs attention towards a highly actual topic of smart fluids finding progressive applications in several industrial areas. It is expected that their importance will even increase, particularly when some hindering issues, eg. efficiency of the fluid themselves, sedimentations, compatibility, etc. are improved. In this view, the presented work focuses on: <sup>i)</sup> the carbonyl iron as dispersed phase and its surface modification via encapsulation with polyaniline to improve the compatibility with silicone oil; <sup>ii)</sup> on the synthesis of cobalt ferrite particles with controlled magnetic properties; <sup>iii)</sup> preparation of hollow globular clusters of titanium oxide/polypyrrolle particles intended as dispersed phase in the electrorheological (ER) fluids. The Author's results presented in the enclosed papers prove that the progress in the mentioned points has been realized.

From the composition point of view, the work consists of 40 pages (plus enclosed publications) and uses the form of summarizing and commenting the published papers; these are 4 plus 1 manuscript. The thesis consists of following chapters: Czech and English abstracts; List of Papers; Theoretical Background; Aims of the Doctoral Study; Summary of the Papers; Contributions to the Science and Practise; Acknowledgement; List of Symbols and Acronyms and References plus the individual papers and manuscript. What is apparently missing is the Author's CV and the complete list of his publications. It is recommended to include them in the future reprints and/or to include them as a supplement to the existing edition.

The papers have already passed demanding reviews in the renowned journals (actual impact factors: 2.096; 2.13; 0.51; 2.44) and therefore their quality is fully unquestionable. Maybe a morphologist would only ask how the sizes of particles/cluster and their distribution illustrated in the individual scanning electron micrographs have been calculated, would point there is no info about the mode used for the investigations and that interestingly each left micrograph in the I, IV, V Papers is slightly diffused; in the Paper III the micrograph is readable with difficulties. Eg. in the Paper I, the creation of core-shell particles and the 0.5  $\mu\text{m}$  shell thickness are known from the literature, are expected or proved within the work?

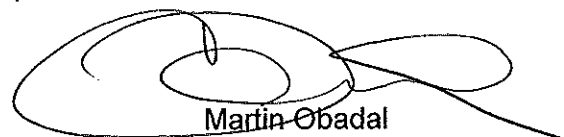
During the thesis defence, the Author could reflect following points:

1. The scientific team of prof. Pavlínek is already well-known in the international scientific community favourably contributing to the progress in the field of electro-/magneto-rheology. The Author could position his thesis into this scientific line describing past and future continuity.
2. In the Chapter Contribution to the Science and Practice – I somehow miss the description of contributions to practise. Can the Author possibly describe the targeted final applications and roughly estimate the practical distance to them?

#### **Conclusion:**

The work possesses a scientific quality dealing with actual topic from the view of both academic but also industrial, uses state-of-the-art techniques and draws appropriate conclusions being accepted in the scientific community through the publications in the renowned journals. Therefore I can recommend the Ph.D. thesis of Mr. Michal Sedlačík to be accepted for its final defence.

In Linz, 14.6.2012

  
Martin Obadal