



Cornell University

Dr. Matěj Velický

matej.velicky@gmail.com

Baker Laboratory  
Dept. of Chemistry and Chemical Biology  
Cornell University  
Ithaca, New York, 14853-1301  
USA

20. září 2017

*Komise pro obhajobu disertační práce Mgr. Milana Boušy,  
Studijní program Anorganická chemie, Univerzity Karlova, Přírodovědecká fakulta*

S odvoláním na mé jmenování oponentem přikládám můj posudek disertační práce v anglickém jazyce. Dodatek v českém jazyce, včetně mého doporučení je uveden v závěru posudku.

The submitted thesis “Preparation and characterization of nanomaterials for electrochemical energy storage” studies the potential of carbon-based nanomaterials including graphene, graphene oxide (GO), and GO/olivine composite. Chapter 1 appropriately reviews the relevant scientific background concerning the properties, preparation, and characterisation of these nanomaterials. Chapter 3 described the experimental work carried out, specifically: 1) spectroelectrochemical measurement of GO and GO/olivine composite for, 2) stress behaviour of graphene dependent on the method of preparation and the number of layers using Raman spectroscopy, and 3) development of a microscale in-situ Raman spectroelectrochemical method for strain measurement. The author supplements his thesis with 4 original peer-reviewed research articles (3 as the lead author, 1 as a co-author), which further support the high standard of the work carried out herein. The author also contributed to a number of other publications/proceedings (listed in Chapter 6). In my opinion, this thesis constitutes a solid piece of scientific work appropriate for an attainment of a doctorate degree.

I have following specific minor comments and suggestions, which should be addressed in full in the final thesis version (if applicable):

1. p.17, chapter 1.2.6, decreasing/increasing orbital overlap as a cause for redshift/blueshift in Raman mode frequencies the could be used as a simplified explanation to non-expert readers.
2. p.18, the equation embedded in Fig. 9 should be numbered.
3. p.22, Fig. 11 legend onwards: “SEC” is an appropriate abbreviation instead of “SECH”
4. p.23, provide more details about XPS measurement, were samples treated in any way before the XPS analysis?
5. p.24, Eq. 3 legend, & p.27 1<sup>st</sup> paragraph, variable symbol should be in *italic*.
6. p.25, Fig. 12, label the stages 1 and 2 in the amorphisation trajectory.
7. p.26, “the maximum capacity of ~90 mAh/g”, compare with the state-of-the-art values.
8. p.29, last paragraph, I recommend including a figure to support the discussion.

9. p.30, chapter 3.2.2, the author should comments on whether the stress and charge transfer are independent or whether they affect one another.
10. p. 30, bottom of the page, the correct symbol ( $\mu$ ) for micrometre should be used.
11. p.31, Eq.4, clarify the units of the variables, i.e  $\text{cm}^{-1}$  and  $10^{13} \text{ cm}^{-2}$ .
12. p.35, “of average diameter  $\sim X-X_0 \mu\text{m}$ ” it is unclear what “X-X0” stands for.
13. p.36, italic font in “ $E_F$ ”
14. p.37, font in Fig. 18 hardly legible.
15. p.40-45, minor formatting errors in Chapter 5 (References)

Přes výše uvedené připomínky zdůrazňuji, že posuzovaná práce splňuje všechny nároky kladené na disertační práci a tvoří velmi dobrý základ pro další autorovou vědeckou činnost. Doporučuji proto, aby práce byla přijata k obhajobě a aby na jejím základě byl Mgr. Milanu Boušovi udělen akademický titul „Doktor“ (Ph.D.)

Se srdečným pozdravem,  
Dr. Matěj Velický

