

## Evaluation report for PhD thesis of Jitka Neburková

Romana Schirhagl

First of all I would like to say that reading the thesis of Jitka Neburkova was a great pleasure. It is very well written. The section on different polymerization strategies is the most understandable description of this topic I read so far. The thesis also seems to be scientifically sound and the solutions presented are very creative. Also an impressive amount of results have been produced during the thesis. In the following I will shortly explain what the contribution to the field was. Overall I would rate the thesis as probably the best thesis I have corrected so far.

Fluorescent nanodiamonds show great potential as nanoscale probes for all kinds of quantities. Additionally, they are perfectly photostable and thus are of great interest as long-term labels. However, there are several limitations that have to be overcome to be useful for these applications. They show poor colloidal stability in presence of salts, which is the case in buffers, body fluids and any common cell media. Furthermore, proteins adsorb to the particles surface.

This thesis aims to circumvent these issues. In the thesis several different approaches are presented, which solve these problems and which offer ways to functionalize the diamond surface.

Reading the thesis has brought up several interesting questions which I would love to discuss with the candidate at the defense.

For instance what are alternatives for the polymeric coating that was presented in this thesis and what are the advantages and disadvantages of these systems?

Page 44 (article 2 but also in article 4) The polymers that were used here seem to be somewhat complex so I am interested in the motivation for choosing this polymer system.

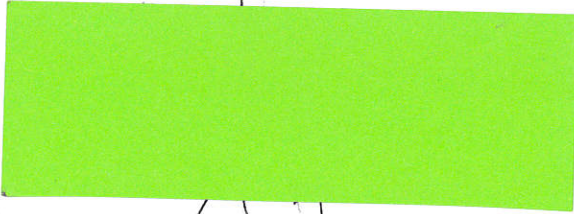
Page 46 (article 3): Alexa fluor molecules were introduced to do flow cytometry. Would it be also possible to use the diamond signal itself and if not why?

Article 6: The killing effect that was observed in this article is quite impressive. I was wondering how it compares to gold nanoparticles alone? Also do you understand what the role of the diamond is in this process?

Page 220: Britton-Robinson buffer was used. Why was exactly this buffer used. Is it beneficial for magnetometry measurements?

The thesis is of great quality and several of the articles are at the forefront of what is currently possible in the field. I also want to complement on the figures, which are optically very appealing. Despite the fact that the articles are very new some of these figures have already gained some fame by being reused a lot by the field.

Finally, I would like to conclude that Jitka Neburkova has delivered a great thesis and has well earned the right to defend and being awarded a doctorate.



Romana Schirhagl, Groningen July 24<sup>th</sup> 2018