

Přírodovědecká fakulta UK  
Předseda komise  
Doc. RNDr Jan Sedláček, Dr.

Brno, 12 April 2022

#### Evaluation of Mr Islam Mohamed Mohamed Minisy's PhD thesis

In this letter, I assess the PhD thesis written by M.Sc. Islam Mohamed Mohamed Minisy, titled "Nanostructured conducting polymer composites".

The thesis presents original research results in the area of syntheses of the conducting polymers by chemical polymerization routes. It presents methods for the novel fabrication of nanostructured conducting polymer composites. The focal points refer to the parameters enabling the formation of size- and morphology- tunable conducting polymer composites with DC electrical conductivity on a large scale. Potential applications of the prepared composites include many areas. Still, the thesis mainly focused on utilization as electrocatalysts for oxygen reduction reactions and water treatment by removing organic dyes and heavy metal ions. The focus of the thesis is on two aspects:

- 1) theoretical background and development within syntheses of the conducting polymers and conducting polymer composites, possibilities to control their morphology during polymerization, a summary of their chemical and physical properties and their potential applications,
- 2) own experimental methodology involved in the thesis, obtained results with scientific evaluation and discussion and conclusion.

M.Sc. Islam Mohamed Mohamed Minisy authored and co-authored 22 peer-reviewed articles (eight articles included in the thesis) that have already impacted the literature with more than 300 citations on the Web of science. As far as I can judge, I think that his research is of high quality, and it was a pleasure for me to read this thesis. The thesis is written on 77 pages and at an excellent professional and linguistic level (I have found only occasional minor grammatical and spelling mistakes). All parts of the thesis, including the abstract, introduction, experimental part, results and discussion, conclusion, and references, indicate that the author knows about his scientific area a lot and understands all facts, objectives, and results he was presenting. I can confirm that all thesis aims were fulfilled.

I did not find anything on what I could complain; just I recommend displaying the scale bar in SEM images in a visible form (Figure 18).

Questions for the defence of the thesis:

1. I wonder if composites prepared by coating carbonized polypyrrole nanotubes with pristine polypyrrole did not suffer from brittleness and lower mechanical stability.
2. The author prepared and characterized several different conductive polymer composites with varying conductivity values. I would suggest preparing a summary graph, which would show the conductivity values from semiconductors to conductors for individual structures which the author prepared. At the same time, he could discuss the composition of the composites and the particular polymerization conditions that affected the resulting conductivity value. Based on the conductivity values, the nanostructured conducting composites could be assigned to the selected application.
3. The author of the thesis could explain how and why molecular weight relates to the conducting polymer's conductivity.

Finally, I can state that the submitted thesis is written at a high professional level. In order to meet the goals of the dissertation, the author processed very well the scientific literature as he used 340 references. Based on the literature survey, his experimental work, and brainstorming with his colleagues and supervisor, the author wrote several comprehensive and well-evaluated scientific works and, consequently, the final PhD thesis.

In summary, my conclusion is that the PhD thesis written by M.Sc. Islam Mohamed Mohamed Minisy presents original research results of significant importance for macromolecular chemistry, and I recommend this thesis for the public defence to award M.Sc. Islam Mohamed Mohamed Minisy with a PhD degree in the field of Macromolecular Chemistry.

Sincerely yours,



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