



UNIVERSITY OF  
CAMBRIDGE

**Prof. D. S. Wright**, Professor of Inorganic Chemistry, Yusuf Hamied Department of Chemistry, Lensfield Road, Cambridge CB2 1EW (U.K.); Tel. 0044 1223 763122 (lab), 0044 1223 336333 (office), Fax. 01223 763122, E-mail [dsw1000@cam.ac.uk](mailto:dsw1000@cam.ac.uk).

*13<sup>th</sup> December 2025*

Institute of Physical Chemistry PAS,  
Secretariat, room 41,  
Ul. Kasprazaka,  
01-224 Warsaw.

**Review of Controlled Transformations of Organozinc Precursor Systems Towards Semiconductor Nanocrystals, by Aleksandra Borkenhagen**

To whom it may concern,

I have reviewed the above thesis, and my report is as follows,

**Subject of the Thesis**

This thesis concerns the investigation of the use of a zinc organometallic as a precursor for the synthesis of semiconducting nanocrystals. After a concise description of the state-of-the-art in the area of nanoparticle and nanocrystal synthesis, methodology and theory (Chapter 1) and a description of the aims of the thesis (Chapter 2), the research is split into several chapters which involve the synthesis and characterization of the zinc precursor employed in the thesis and some preliminary studies of the hydrolytic decomposition into semiconducting ZnO nanoparticles (Chapter 3), weathering studies in which the precursor is exposed to moisture to obtain ZnO (Chapter 4), the use of sublimation as a means of purification (Chapter 5), the extension of the methodology to ZnS nanoparticles (Chapter 6), and some studies of air- and moisture-exposure of the precursor employed in solution (Chapter 7). The thesis finishes with a conclusions section (Chapter 8) and a short experimental section (Chapter 9).

There is no doubt that the studies presented in this thesis are new and original, that the thesis demonstrates the candidate's knowledge of this area and the ability to undertake independent work, and that the work presented in the thesis is her own (it conforms to the guidelines specified in article 187 of the act of July 20<sup>th</sup>, 2018, as required).

**Style and Presentation**

The thesis is well written, and the English is good (with very few grammatical or typographical errors). The figures are very well presented and there is a nice, flowing narrative to the entire thesis, which is easy to read and written in simple language (without unnecessary hype). A lot of thought and proofreading have gone into the writing of this thesis and it shows.

**Scientific Merit and Achievements**

The thesis clearly presents original and important results in this field, specifically, the development of a precursor that can decompose into ZnO or ZnS nanoparticles at room temperature in the presence of moisture without additional energy, the mechanistic insights from this study, the comparison of solid-state and solution decomposition, and the introduction of simple purification procedures. There is no doubt that much of this work will be publishable in the current form (if it has not been already).

If there is one criticism that I could make it is that, although the work is very carefully done (and this is not easy work), the thesis is quite light (only 140 pages, of which about 85 pages is original work). While the quality of the studies presented and their scientific worth are not in question, it would,

for example, have been nice for the candidate to have built on some of the more fundamental conclusions concerning acidity by developing some related organometallic precursors using this knowledge (potentially offering phase and/or morphological control of the ZnO formed). I appreciate that *real* research is always much more difficult than it is on paper and that the proof of principle that the thesis describes is of fundamental future value in this area. However, I think that some questions in the viva on, for example, were there any directions the candidate explored during the research which are not included in the thesis? It would also be of value to ask where the candidate would go next with these studies (since there are no suggestions for future work in the thesis).

**Recommendation**

I have examined many Ph.D. theses in the U.K., the rest of Europe, India and Australia over the years and I think that this thesis is certainly above average in its style and rigor. I recommend that the candidate should be awarded a Ph.D. on the basis of this thesis.

Yours sincerely,



Dominic S. Wright