Review of: "Correlating exciton coherence length, localization, and its optical lineshape"

Valentina Rein[1]

1 European Synchrotron Radiation Facility

Potential competing interests: No potential competing interests to declare.

The study provides valuable insights into the behavior of excitons in disordered semiconductors, particularly in polymeric semiconductors. It highlights the interplay between electronic interactions, local microstructures, and temperature in governing exciton properties. The authors' unified model, which considers both exciton and lattice effects, offers a comprehensive framework for understanding exciton localization. Overall, this preprint contributes significantly to our understanding of exciton behavior in complex materials and provides a basis for further investigations into exciton localization and lineshape broadening in various systems.

Here are some comments and suggestions for improvement:

1. While the paper contains valuable information, the presentation can be challenging to follow at times due to its technical nature. Consider providing more intuitive explanations and figures to aid readers in grasping the key concepts. Visual aids can be particularly helpful in understanding complex models.
2. The introduction could be more explicit about the real-world applications and significance of this research. How might the findings on exciton behavior in disordered semiconductors be applied in practical scenarios or benefit the field of materials science?
3. Ensure that specialized terminology is well-defined or accompanied by clear explanations. This is essential for readers who may not be experts in the field.
4. While the paper discusses the model's results in relation to previous research (Refs. [4] and [5]), a more detailed comparative analysis would strengthen the paper. Explain how your findings align with or differ from these prior studies. Are there any limitations in the previous models that your approach overcomes?
5. Provide some insights into potential practical applications of the research findings. How might this knowledge be applied in the development of new materials or technologies? Discuss any implications for designing more efficient electronic devices or photovoltaic systems.
6. If possible, consider suggesting avenues for experimental validation of the model. This could enhance the paper's practical relevance and provide a bridge between theoretical work and real-world applications.
7. The paper would benefit from a more comprehensive concluding section that summarizes the key findings and their broader implications. This section could also highlight any remaining open questions or areas for future research.