Lessons learned from device modeling of organic & perovskite solar cells

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Propositions

accompanying the dissertation

LESSONS LEARNED FROM DEVICE MODELING OF ORGANIC & PEROVSKITE SOLAR CELLS

by

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1. The exciton diffusion length in non-fullerene acceptors is strongly related to the stiffness of the conjugated core. (Chapter 2)
2. The characterization of the mobility using steady-state techniques is sufficient to discuss the transport and extraction in organic solar cells under operating conditions. (Chapter 3)
3. The classical analysis of SCLC measurements needs to be corrected to account for the presence of moving ions in perovskites. (Chapter 4)
4. The charge transport layers in perovskite solar cells need to be optimized carefully as they can strongly limit the fill factor. (Chapter 5)
5. The ideality facotr of perovskite solar cells does not only depend on the dominant recombination process making it a poor predictor of the main loss channel. (Chapter 6)
6. The use of complex models, that need to be solved iteratively, is feared and downplayed by part of the scientific community while they are willing to use simplistic equations to explain their measurements, even though these equations are often special cases or simplification of said models.
7. The rise of automated experimentation will allow scientists to perform experiments at an unprecedented scale and reduce the burden of performing repetitive tasks off the backs of Ph.D. students.
8. While models are not absolute they are definitely useful.
9. Scientific publishing is broken in many ways, it exploits freely scientists without compensation, it focuses on the numbers reported rather than on the actual physical understanding and the reproducibility of the results sometimes questionable.
10. A large portion of the published papers in solar cell research could be replaced by data reports.
11. Collaboration is one of the most enjoyable parts of science.