

ASNAEM-2021 Workshop



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Solar cell simulations made easy

Numerical device simulations are a very powerful tool for the development of new types of highly efficient solar cells. The underlying theoretical framework describes many details of the complex flow of light through a photovoltaic device down to the atomic level. We will give a general overview of state-of-the-art device simulation methods and show that the most crucial simulation parameters can be taken from first principles quantum mechanical numerical calculations. This allows for the development of novel types of photovoltaic devices entirely on a computer. However, it also turns out that in many cases, simpler types of simulations involving the Shockley diode equation plus a realistic set of materials parameters are often sufficient to get a first idea about the performance a novel type of photovoltaic device. We will present some of these simplified approaches and describe how to combine them with experimental studies to develop more efficient types of photovoltaic devices.

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