



Modelling

ECN

Benchmarking numerical device simulations of crystalline silicon solar cells

Location of the infrastructure : ECN, the Netherlands

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Objectives :

- Benchmarking software package for 1D, 2D or 3D simulations of crystalline silicon solar cell and/or modules.
- Defining benchmark studies
- Computation of 1D, 2D or 3D cell architectures.
- Assessing models by :
 - Performing sensitivity studies for several parameters, or
 - Testing different sub-models, like for mobility, free carrier absorption, Auger etc., or
 - Interpretation of physics, or
 - Testing complex concepts (E.g. heterojunctions, MIS), or
 - a combination of these items.
- Discussing modeling issues and results with the TNA host.

Main features :

The 2D and 3D semiconductor package Atlas from Silvaco is present at ECN as well as other 1D packages.

Limitations or constraints :

The TNA guest can have access to ECN's 1D and 2D/3D simulation packages. However for the sake of benchmarking a guest can compare the results of ECN's software package with its own package(s).

Typical services or results :

A benchmark study for several cell concepts, ranging from simple 1D problems to complex 3D problems.

An article or paper that shows the differences and similarities of multiple software packages in the field of crystalline silicon solar cells simulation

An article or paper that shows the impact of chosen submodels and/or sensitivity to certain input parameters.

Examples of research projects :

Models for numerical device simulations of crystalline silicon solar cells—a review, P. Altermatt, J Comput. Electron (2011) 10:314–330