Solar Cell Utility

The Solar Cell Utility† provides an optical and electronic simulation solution for solar cell devices. The utility simplifies common tasks associated with solar cell design and aids in the rigorous computation of J-V curves, quantum efficiency spectra, and overall cell efficiency. The basic version of the Solar Cell Utility uses a simple electronic model and operates with one or more RSoft optical simulation tools††. If a rigorous electronic modeling solution is desired, LaserMOD can be used. The Solar Cell Utility LaserMOD option provides a limited license of LaserMOD for this purpose.

Benefits

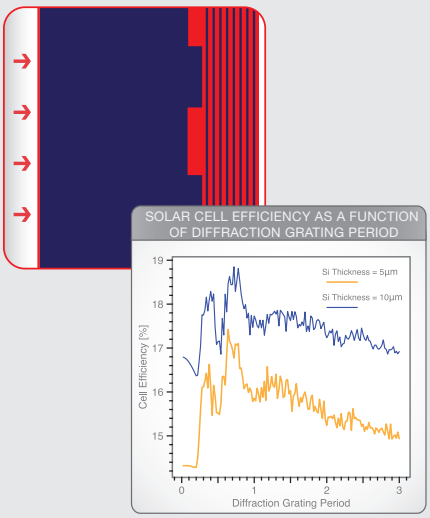
- Rigorous optical simulation is performed by one of RSoft's passive optical design tools.
- Can use either a simple electronic model or RSoft's rigorous LaserMOD simulation tool.
- Fully integrated into the RSoft CAD Environment (page 6).

Applications

- Solar cell design
- Solar cells with diffractive optical elements (DOEs)
- Solar cells with randomly textured material interfaces
- Ideal for investigating the electronic nature of solar cells

Featured Application

Schematic of solar cell structure along with solar cell efficiency computed by DiffractMOD as a function of the period of a diffractive optical element within the cell.

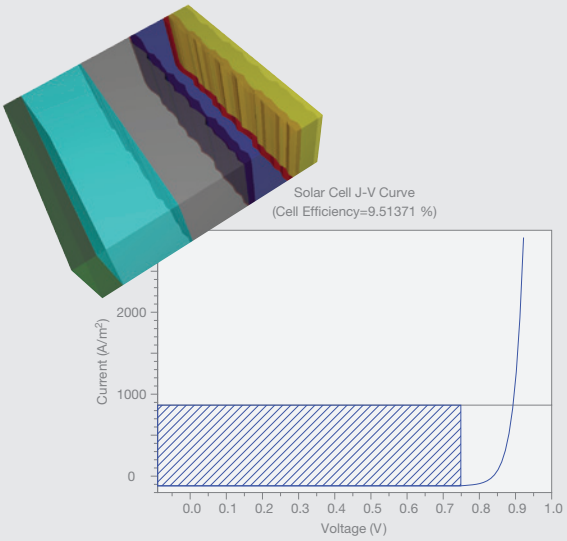


†The Solar Cell Utility provides users of some of the RSoft optical simulation tools the functionality described here. All simulation tools are licensed separately.

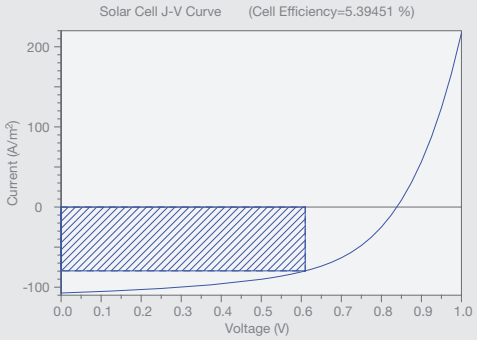
††Consult a Synopsys representive to determine which combinations of products are currently supported.

Features

- Arbitrary solar cell geometry can easily be created in the RSoft CAD.
- Important material properties such as frequency-dependent complex refractive indexes can be used to correctly model absorptive materials.
- Simple electronic modeling via modified Ideal Diode equation; rigorous modeling via LaserMOD tool.
- Uses the AM1.5 Solar Spectrum as incident spectrum by default; a user-specified spectrum can also be used.
- Direct user control over shadowing, filling-factor, and collection efficiency.
- Accounting of parasitic resistances in both simple and rigorous electronic models.
- Outputs include cell efficiency, J-V curves, and quantum efficiency spectra in addition to the standard output from the simulation tool(s) used (DiffractMOD, FullWAVE, and/or LaserMOD).
- Automated parametric studies and design optimization using MOST (page 24).



J-V curve for solar cell with randomly textured interfaces computed using Ideal Diode electrical model and FullWAVE.



J-V curve for the same solar cell above computed with LaserMOD and FullWAVE.

SEE PAGE 42 FOR SYSTEM REQUIREMENTS