



SILVACO

Optical Simulations

Light Emitting and Absorbing Devices

Contents

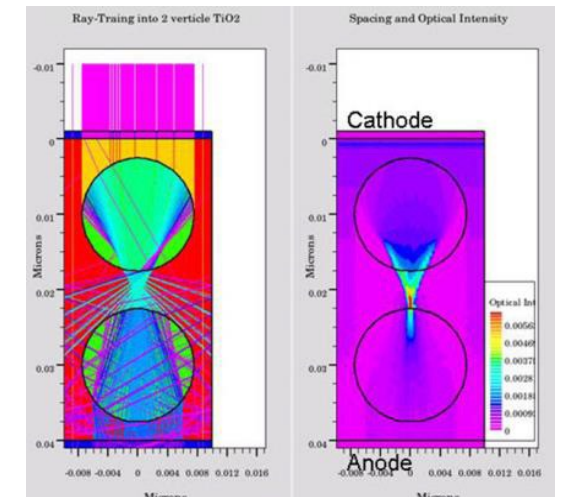
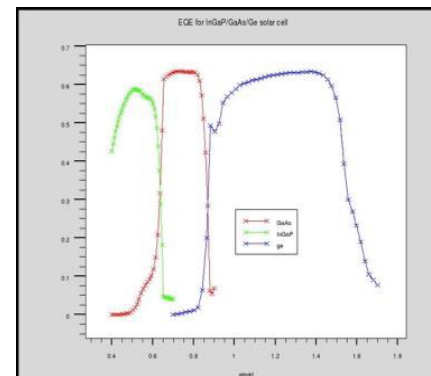
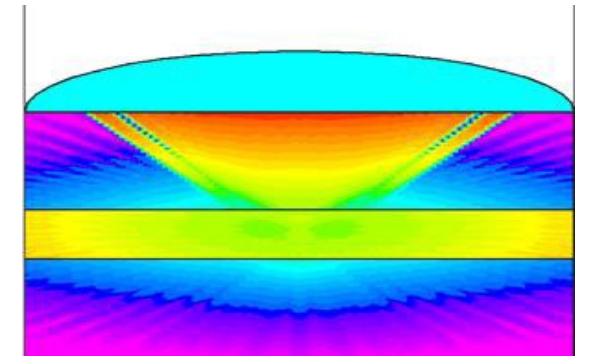
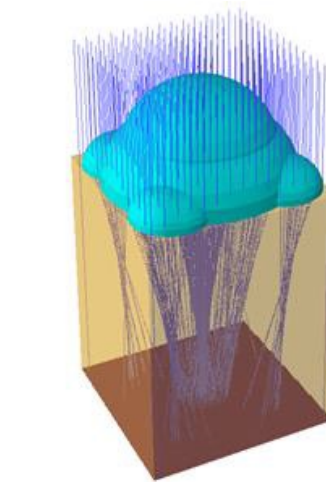
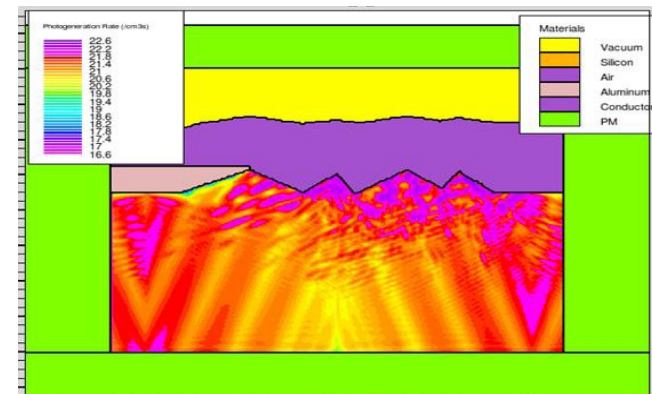
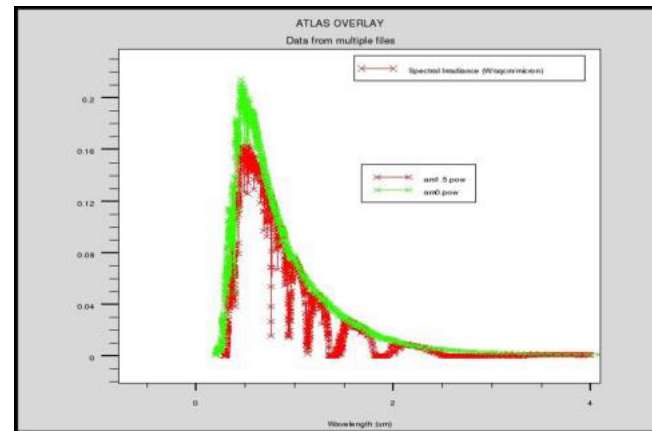
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 - Light emitting diodes
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Light Models

- Optical simulation methods ranked from fast and less physical, to slower and fully physical
- Ray tracing - **Fast, but no physical interference**
- Transfer matrix method - **Interference effects only calculated in the ray propagation direction**
- Beam propagation method - **3D interference, but only valid for narrow propagation angles, such as waveguides**
- Finite Difference Time Domain - **Full 3D Physics**

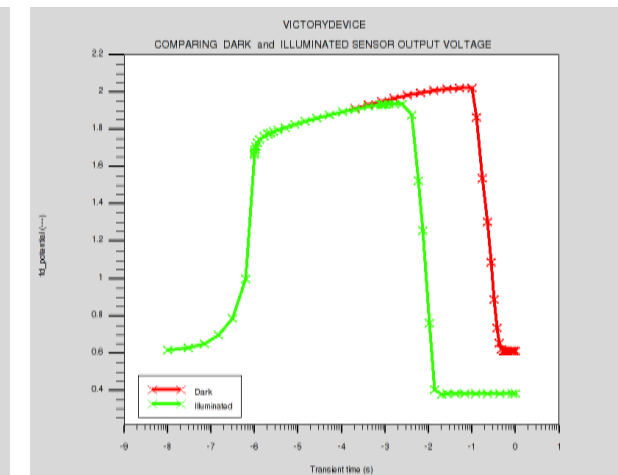
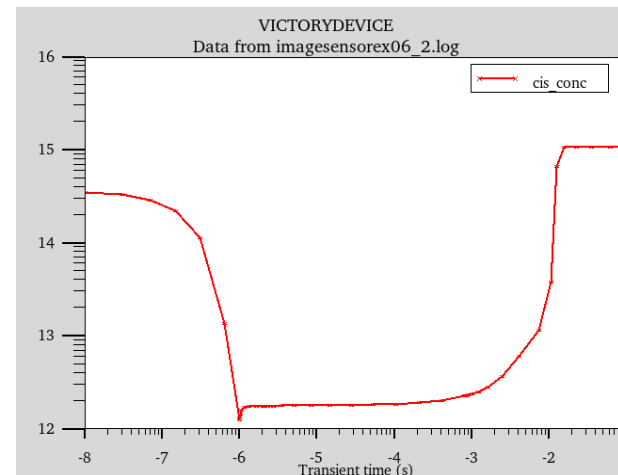
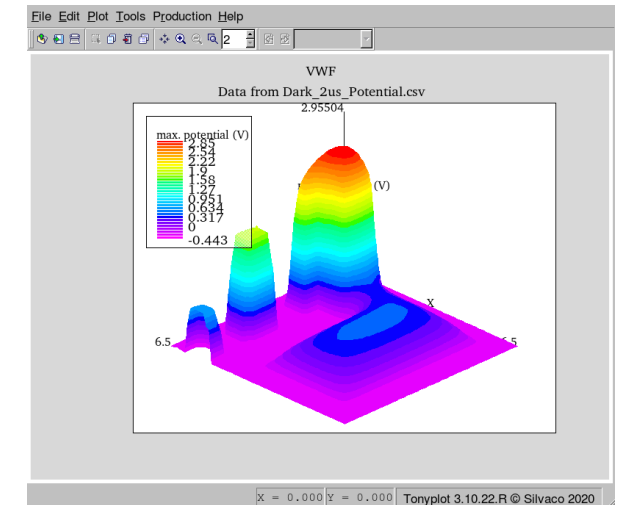
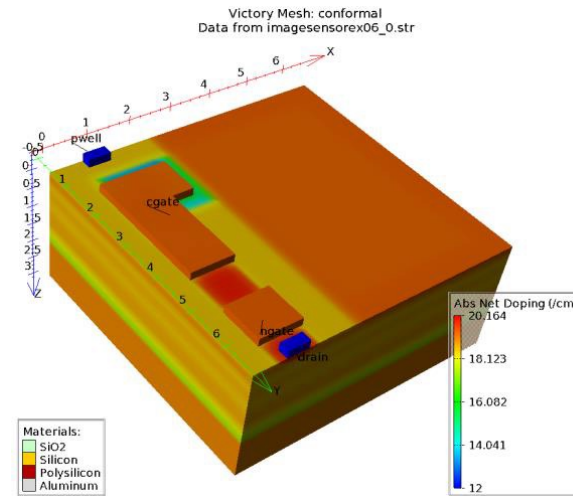
Light Absorption Solar Cells

- Many material and design types used in solar cells
- Solar spectra
- Triple cells
- Anti reflective
- Surface roughness
- Lens
- Material database

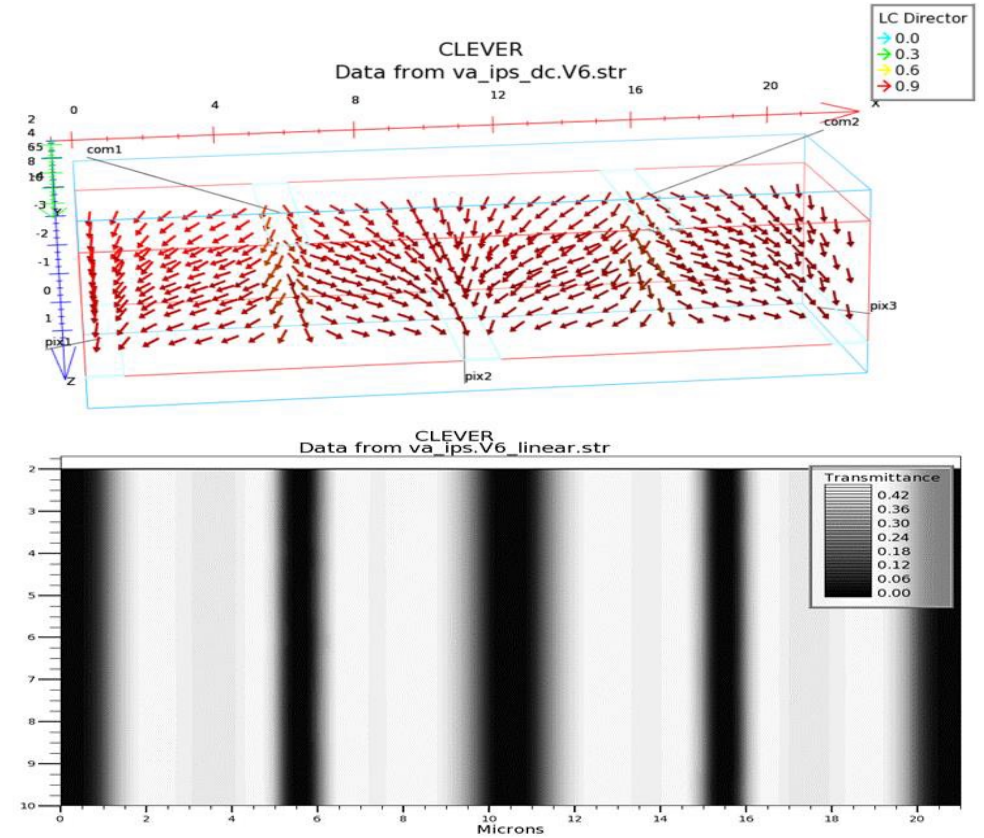
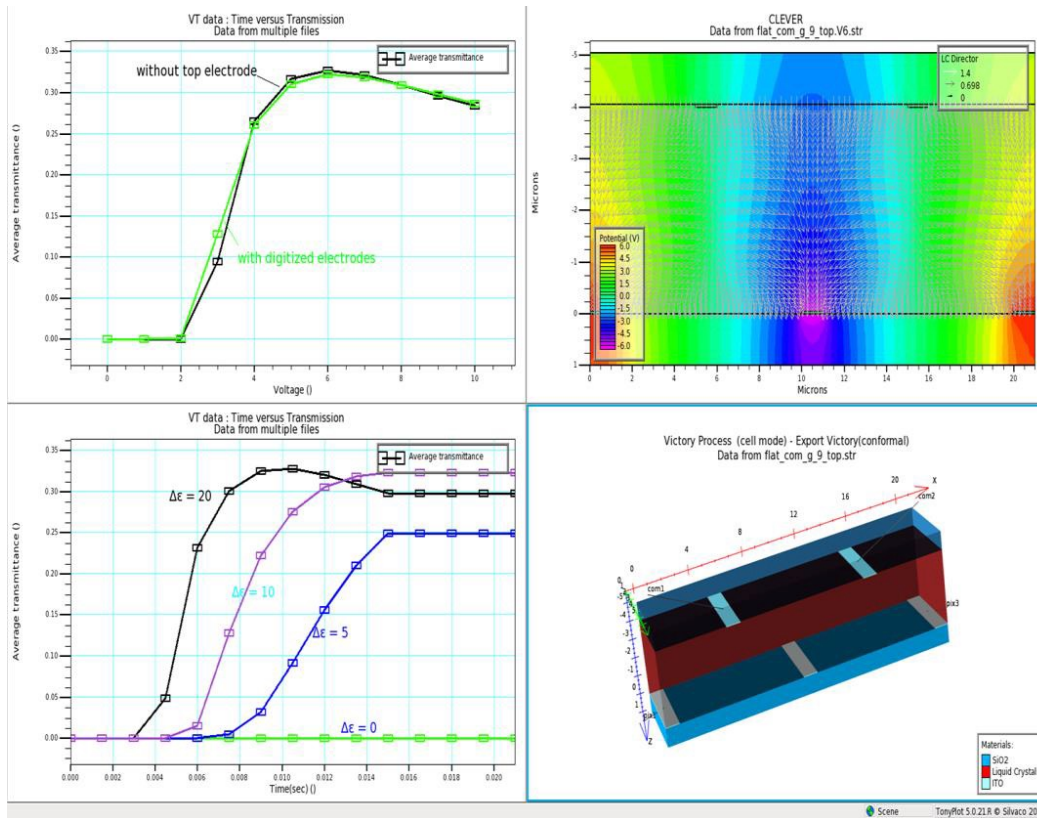


Light Absorption Image Sensors

- Efficient large structure 3D builder
- Areal maximum potential surface response
- Transient simulations



Light Absorption Liquid Crystal

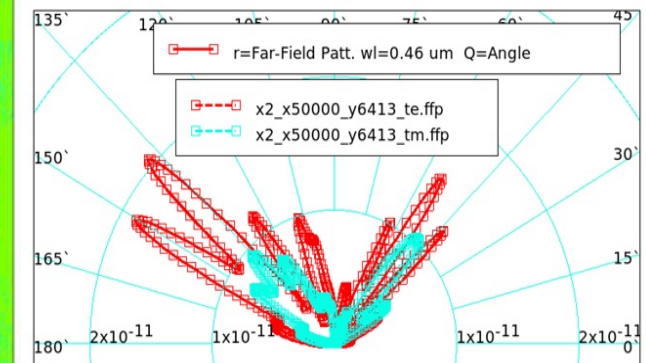
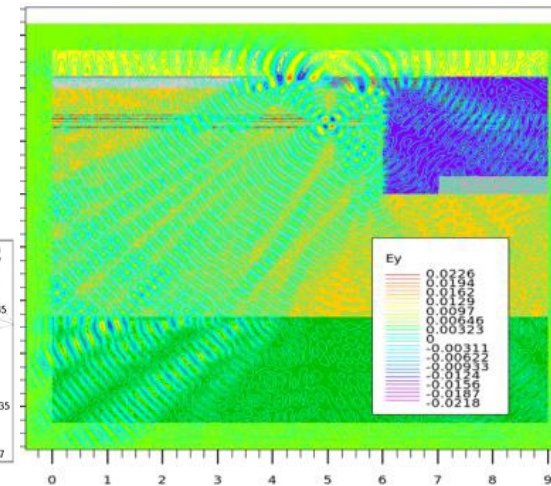
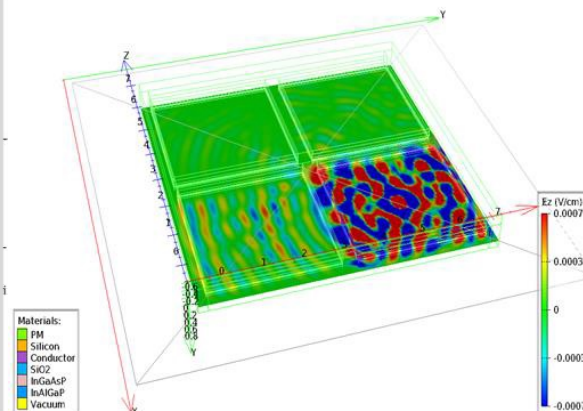
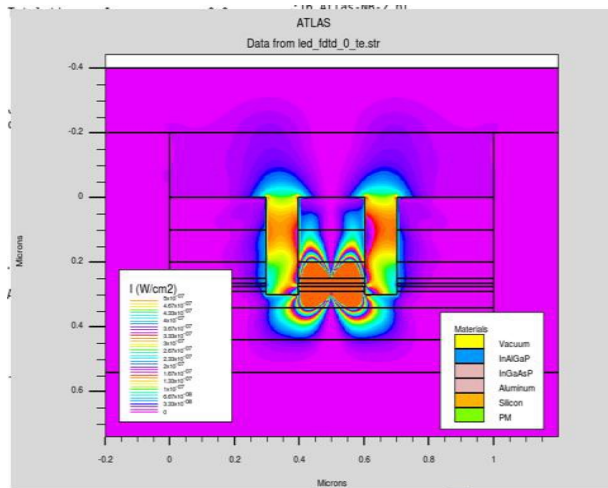
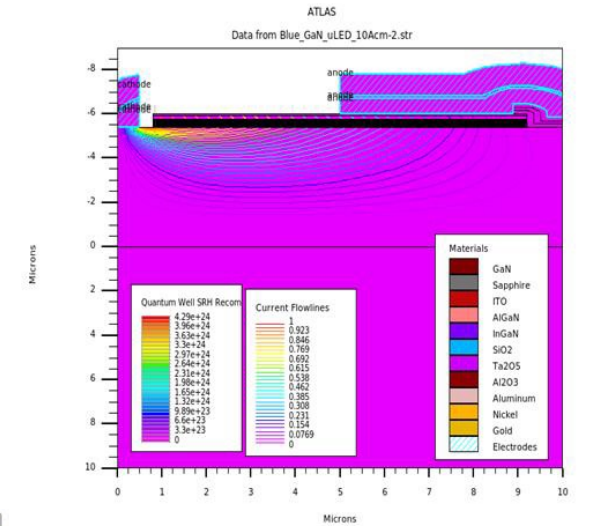
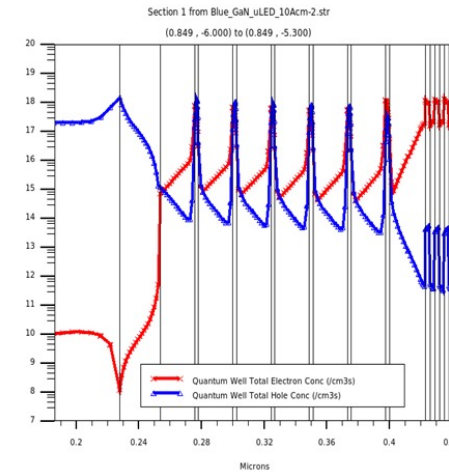


DC, transient and light transmittance LC director response

Light Emission Light Emitting Diodes

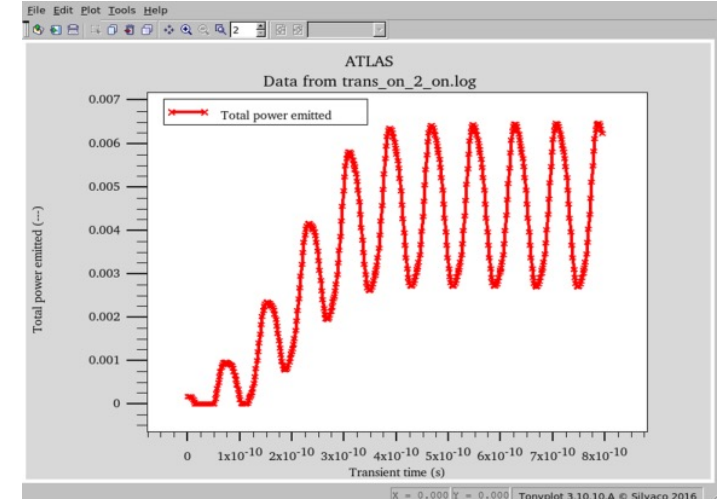
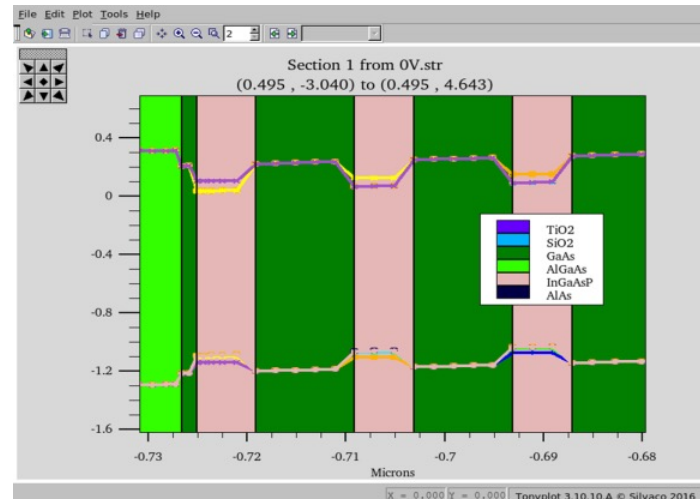
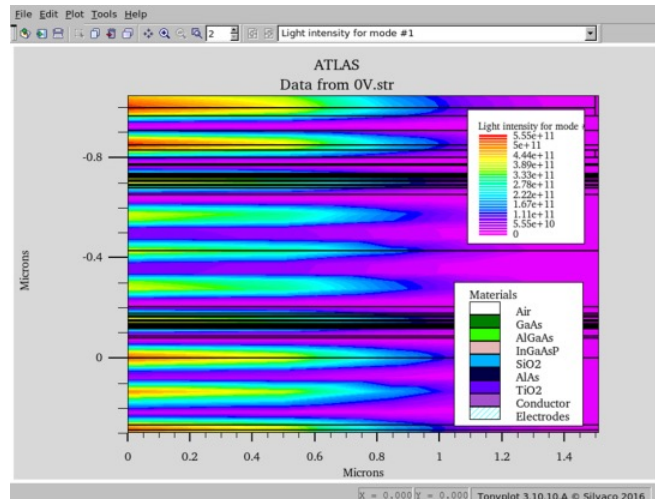
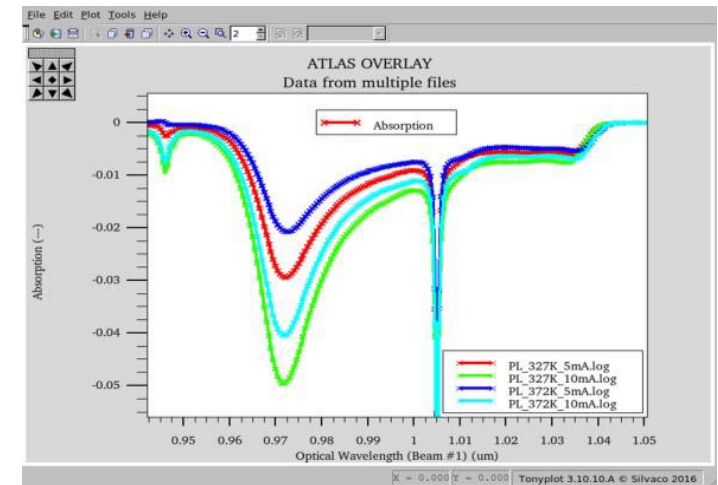
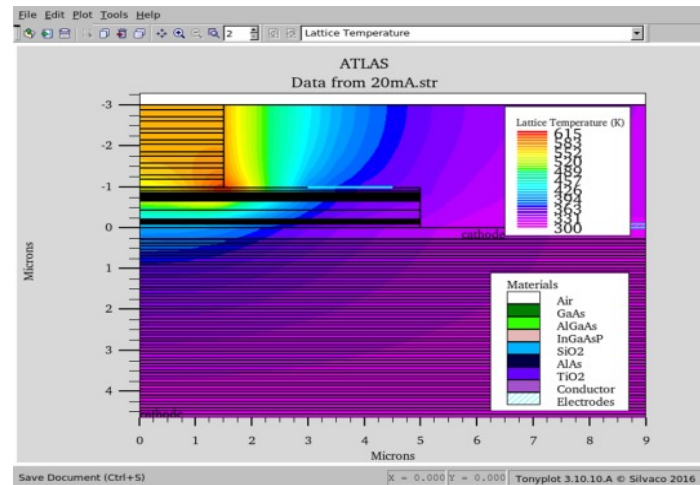
- Many different material systems and designs
- Far and near field intensity
- Quantum effects
- Self heating

ATLAS
Data from led_fdid_te.str



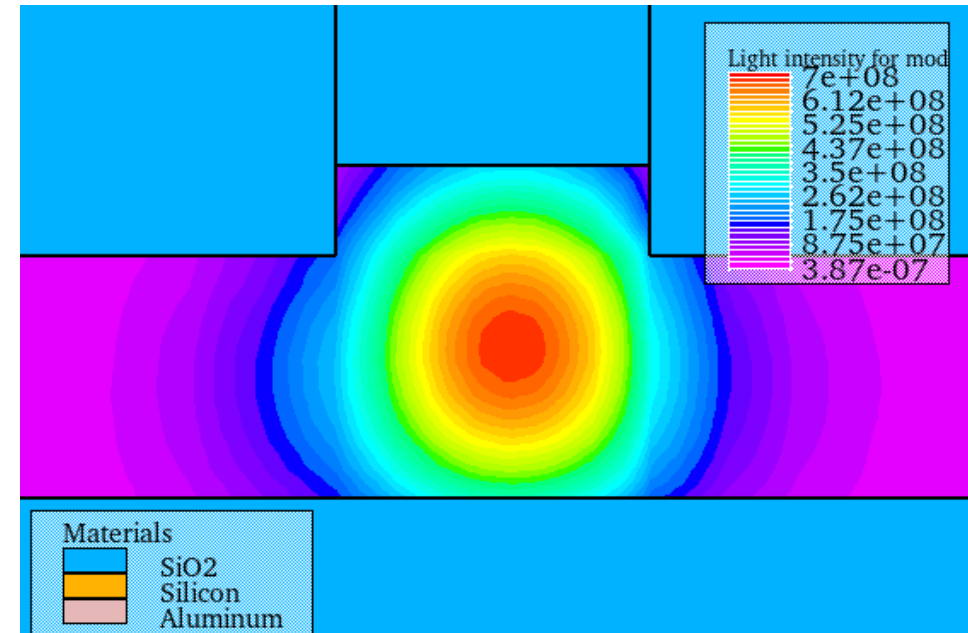
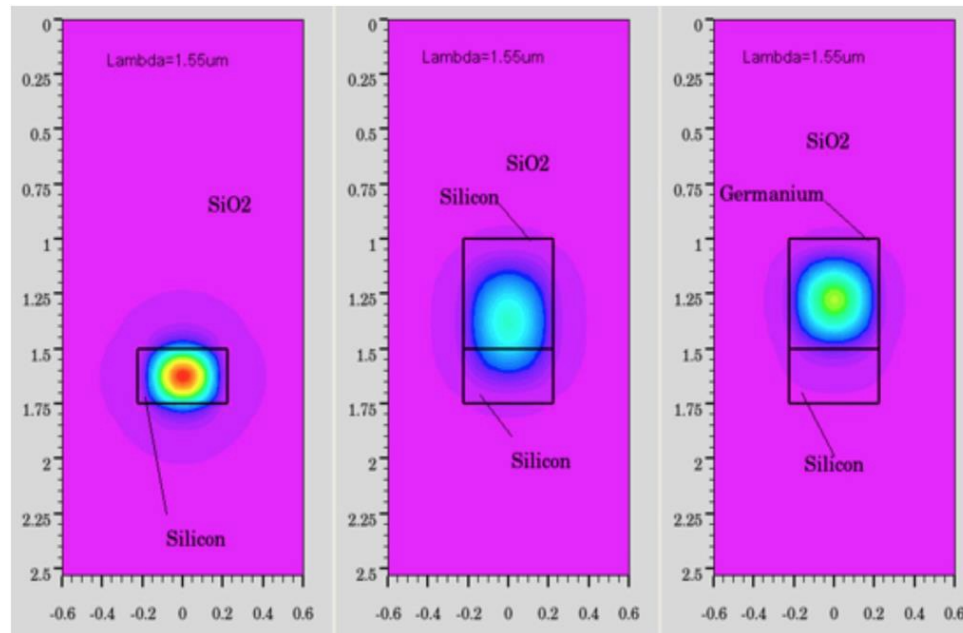
Light Emission VCSEL

- Mode solver
- Self heating
- DC & transient
- Spectra



Waveguides

- Mode solvers
- Suitable for the beam propagation method



Summary

- Integrated solution no hopping between tools
- Self consistent solutions Electrical, Optical, Thermal
- Active and passive optical devices possible
- Many different light propagation methods
- Large material database
- Efficient 3D structure creation methods
- Design of Experiments environment