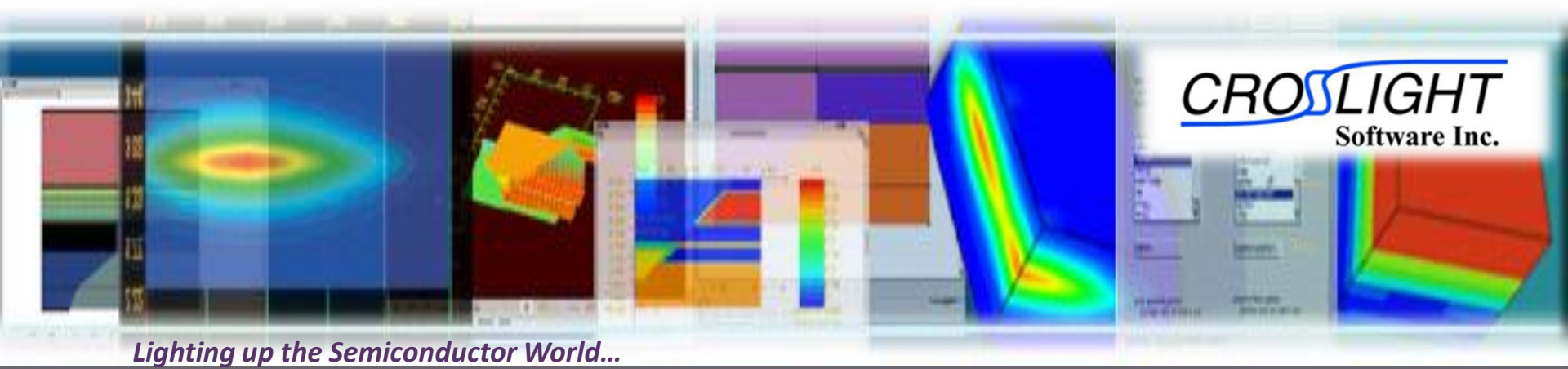


*Lighting up the Semiconductor World…*

# SemiCrafter: The Art of 3D TCAD Mesh Generation

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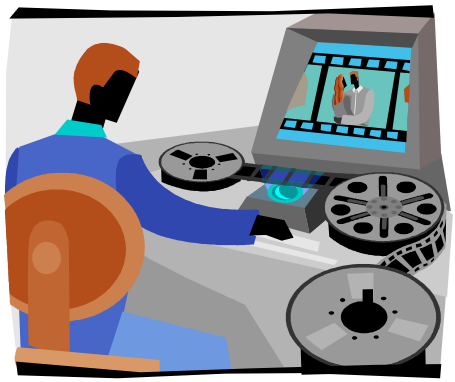
# SemiCrafter



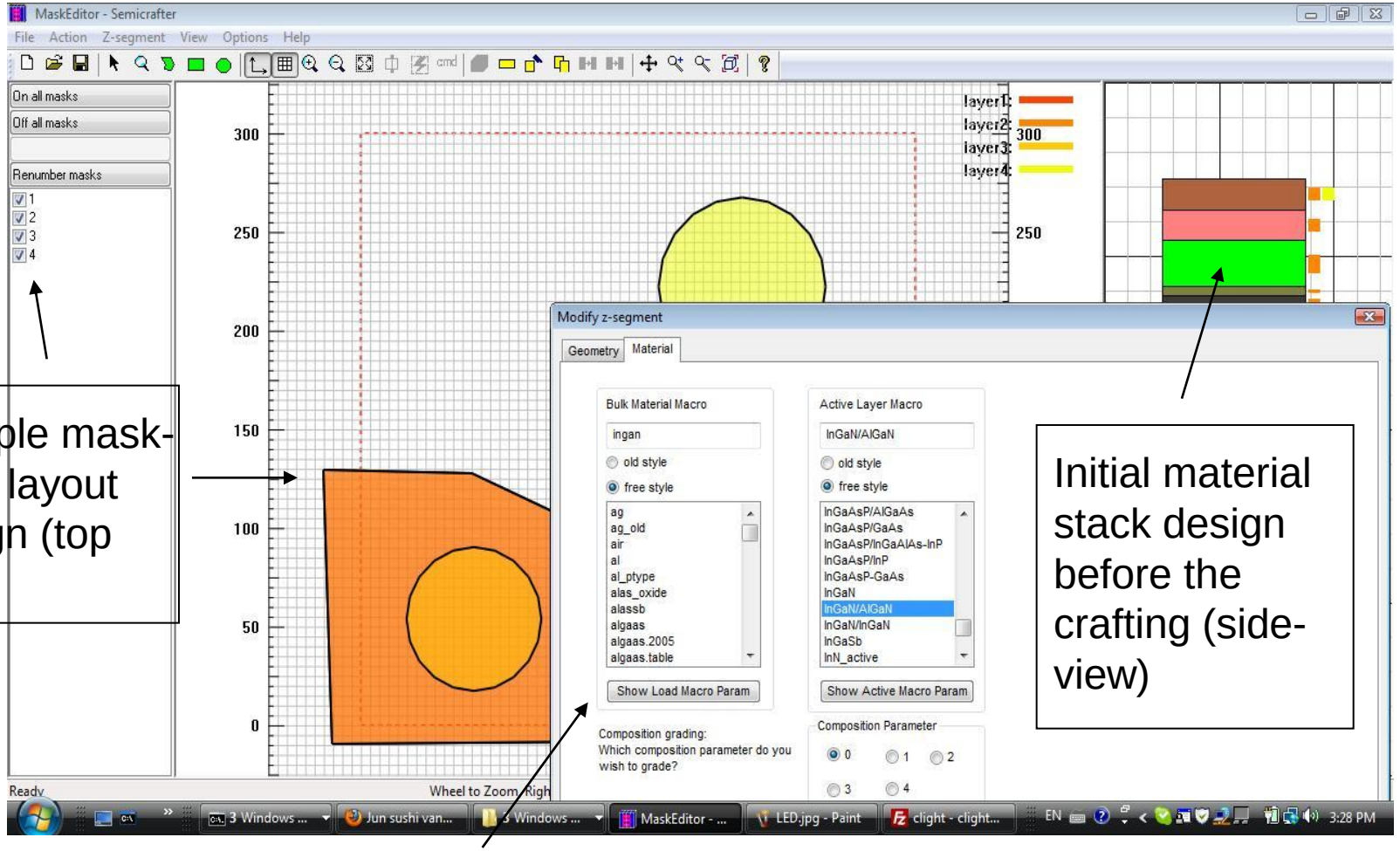
## What's SemiCrafter?

•A powerful 3D TCAD mesh generation/editing tool.
•Based on the CSuprem(3D) simulation program .
•Cutting/refilling a stack of mesh planes to construct complicated 3D mesh in multi-domain.

## What are the Applications?

•SemiCrafter is a general purpose layout/mesh-generator.
•Works seamlessly with CSuprem to create 3D structure for virtually all types of semiconductor devices, like LED, solar-cell, MOSFET etc.
•Most suitable for 3D geometry with rounded shapes, such as complex electrode layout in LED, photonic crystal in LED/VCSEL, power MOSFET with rounded gates, etc.

# Get to know SemiCrafter with an LED Example

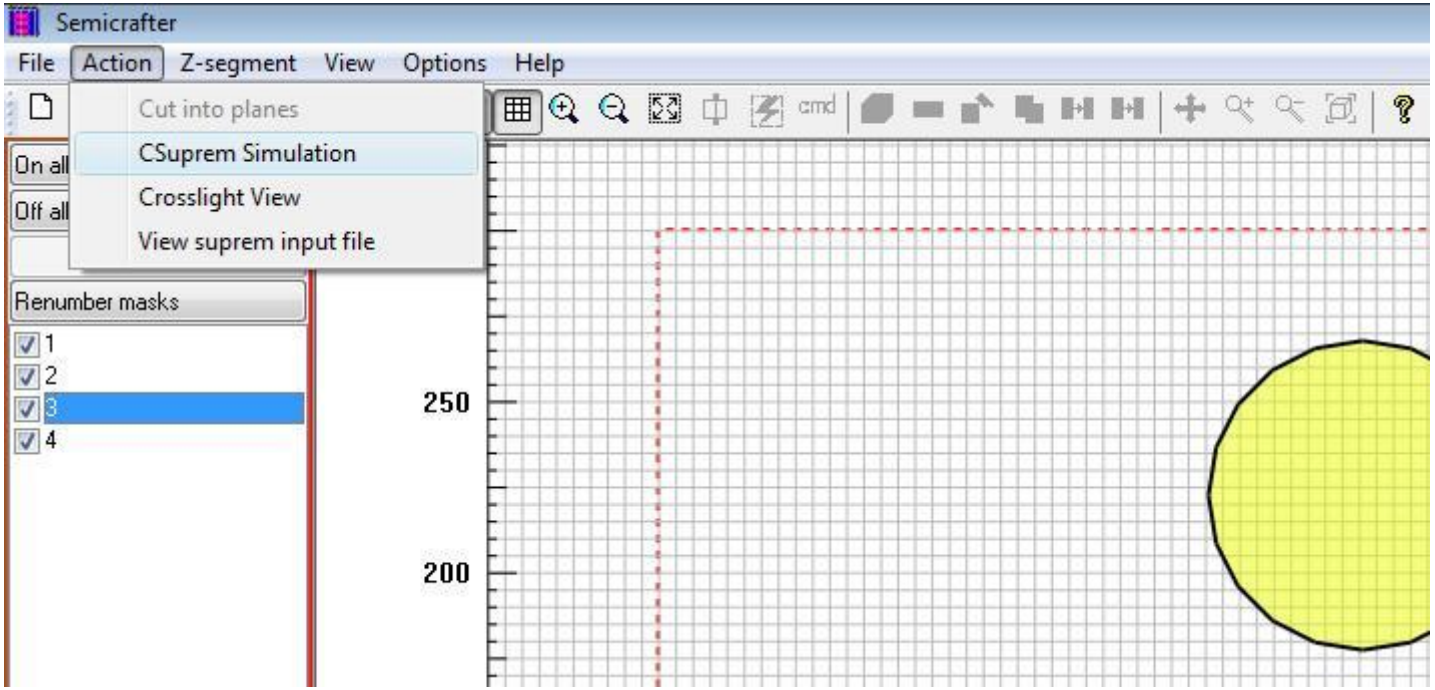



Multiple mask-layer layout design (top view)

Initial material stack design before the crafting (side-view)

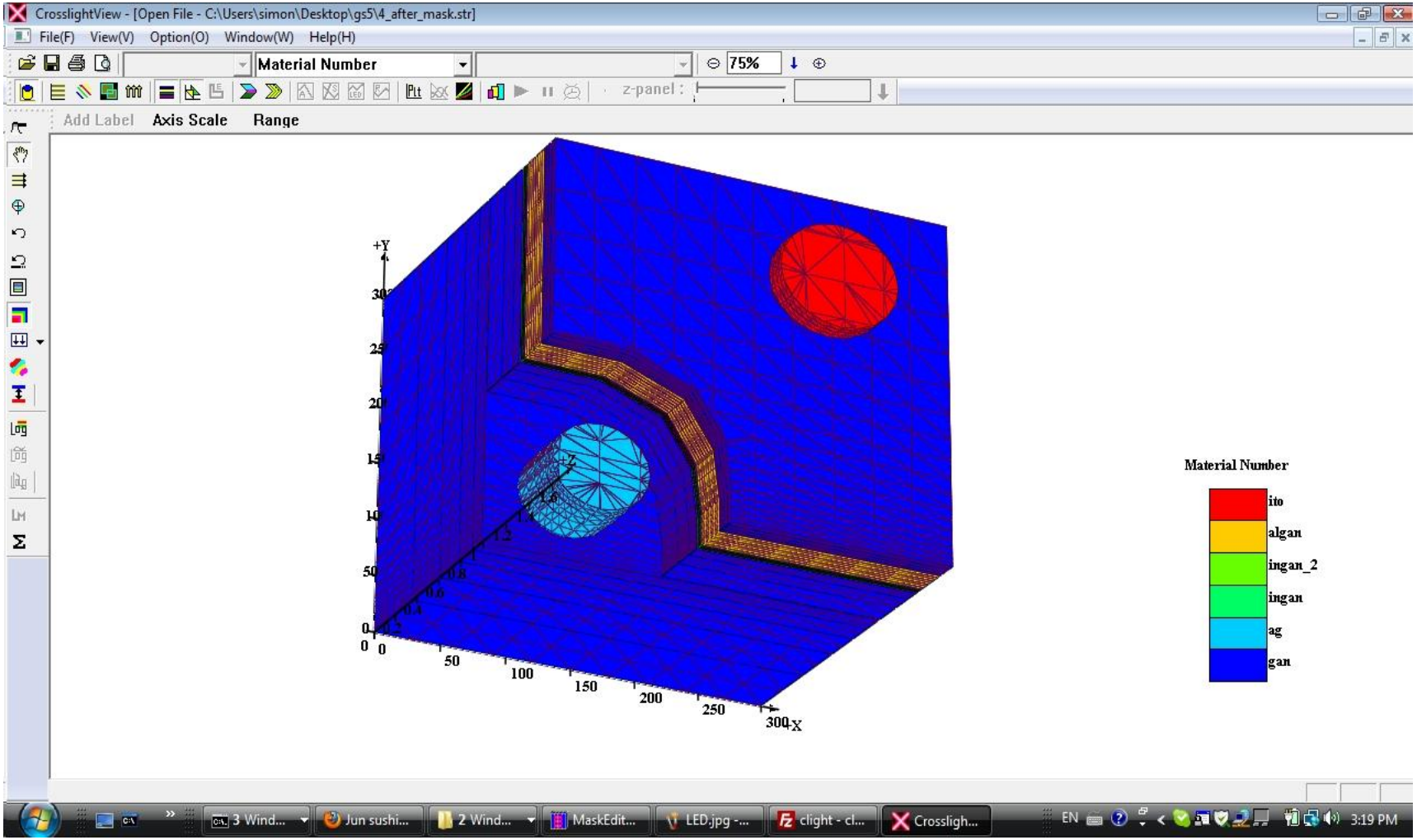
Access to dozens of Crosslight material macros

# Direct integration with CSuprem

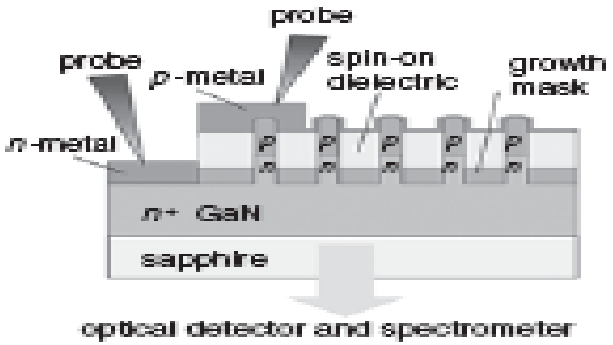



- Just “save” to generate CSuprem input file.
- Direct integration with CSuprem and CrosslightView.
- Monitor crafting process step by step using the “restart” feature in CSuprem.
- Truly “what you see is what you get” tool.

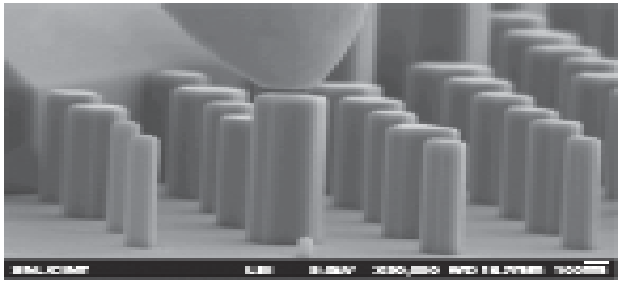
# SemiCrafter : LED 3D mesh done



# SemiCrafter example: photonic crystal nano-wire LED




a



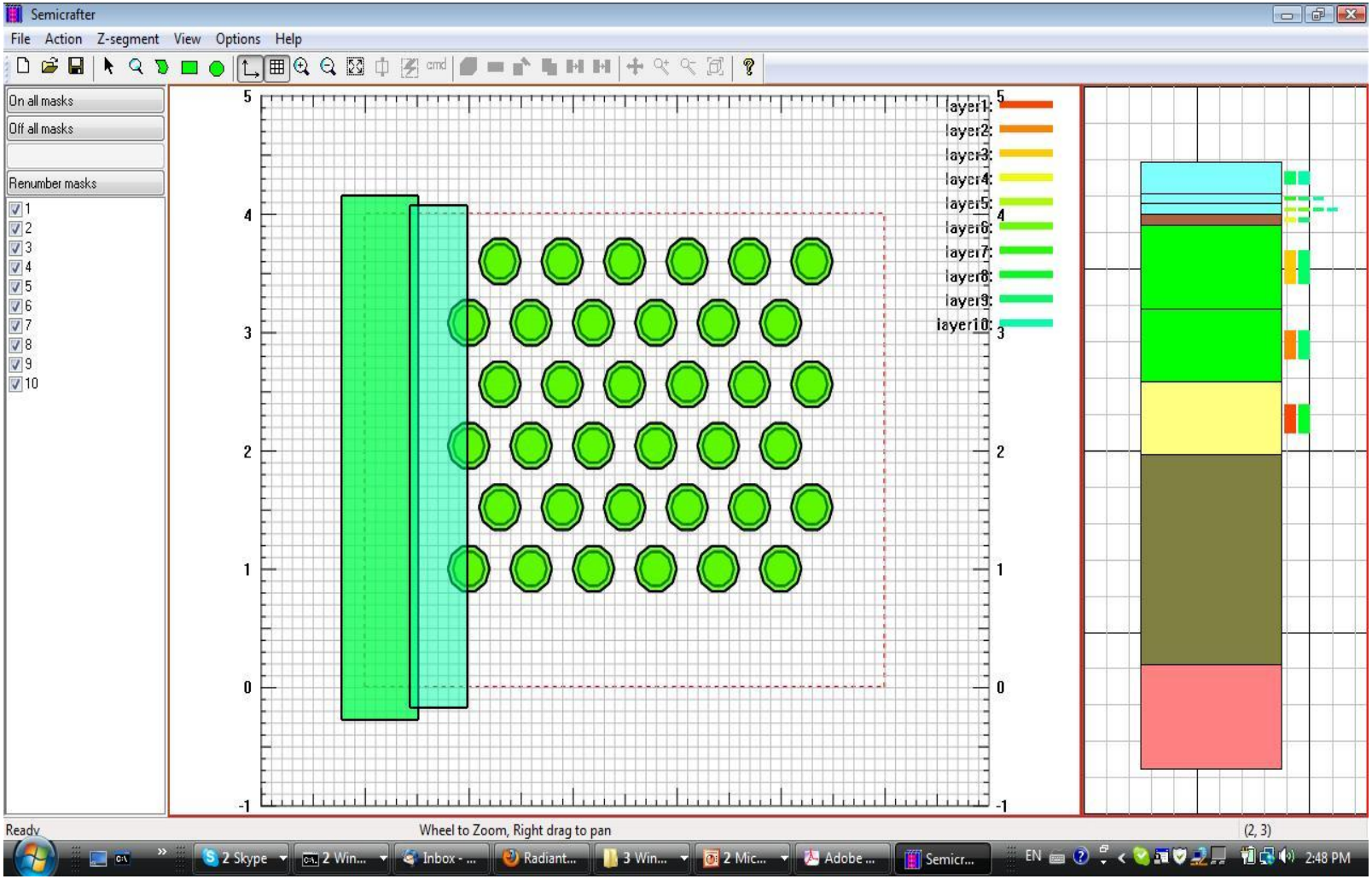
b

**Fig. 1** *Schematic showing cross-section of nanowire array LED. (EL intensity and spectrum measured through sapphire substrate) and SEM image showing electrical probing of individual pn-nanowire diode near edge of patterned growth template*

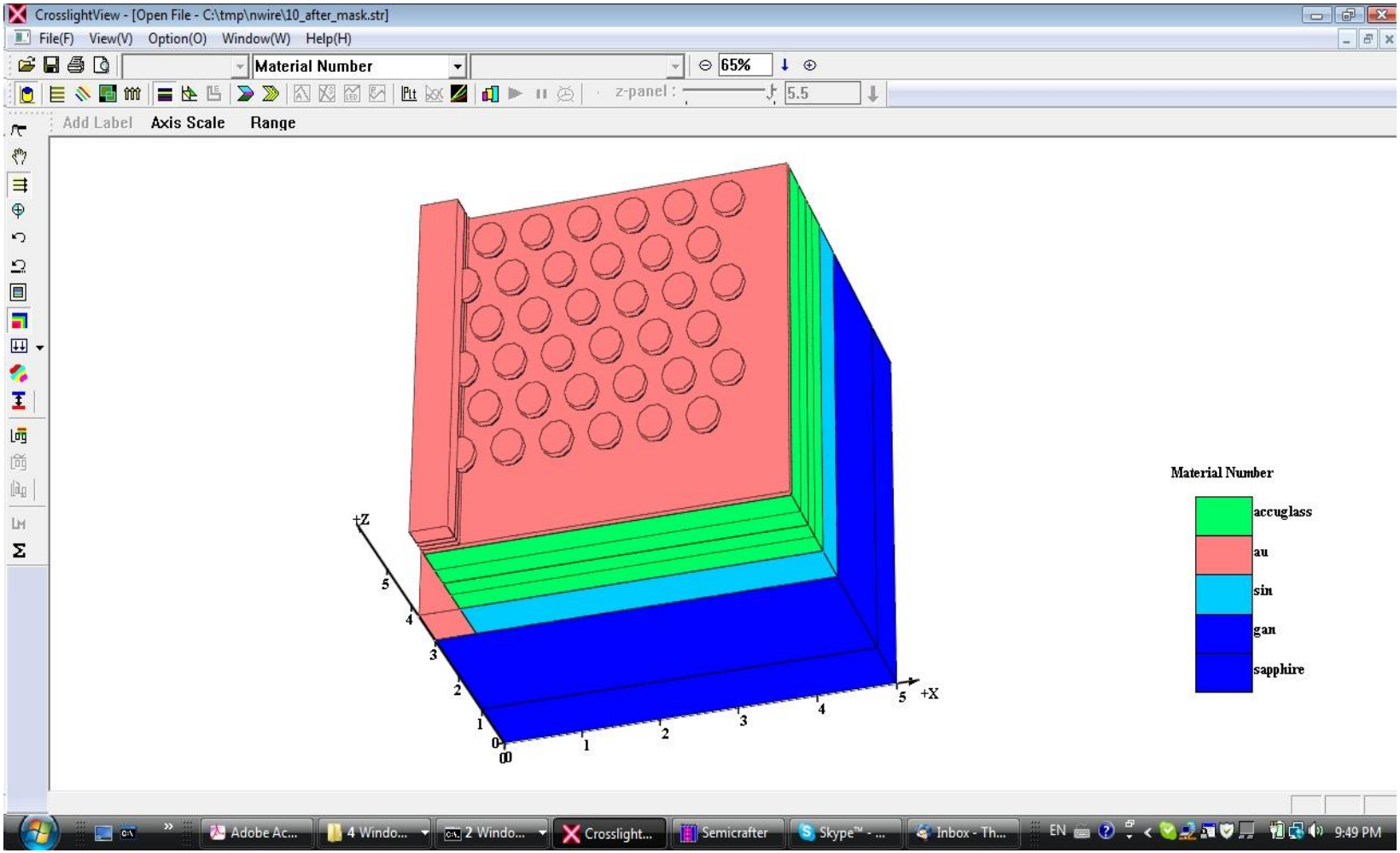
*a* Schematic
*b* SEM image

"GaN nanowire light emitting diodes based on templated and scalable nanowire growth Process," S.D. Hersee, M. Fairchild, A.K. Rishinaramangalam, M.S. Ferdous, L. Zhang, P.M. Varangis, B.S. Swartzentruber and A.A. Talin, ELECTRONICS LETTERS 1st January 2009 Vol. 45 No. 1

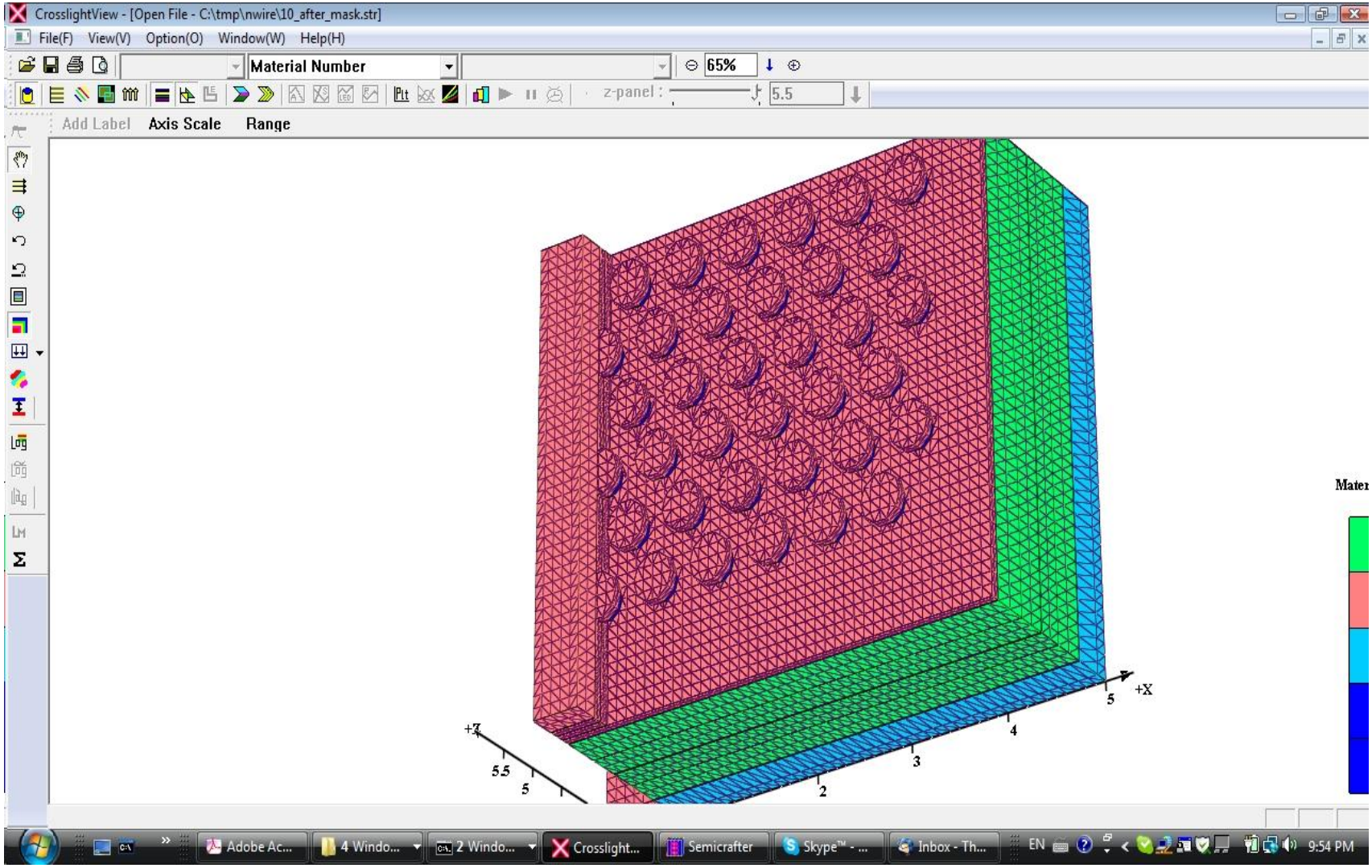
# SemiCrafter example: Layout for nano-wire PhC LED



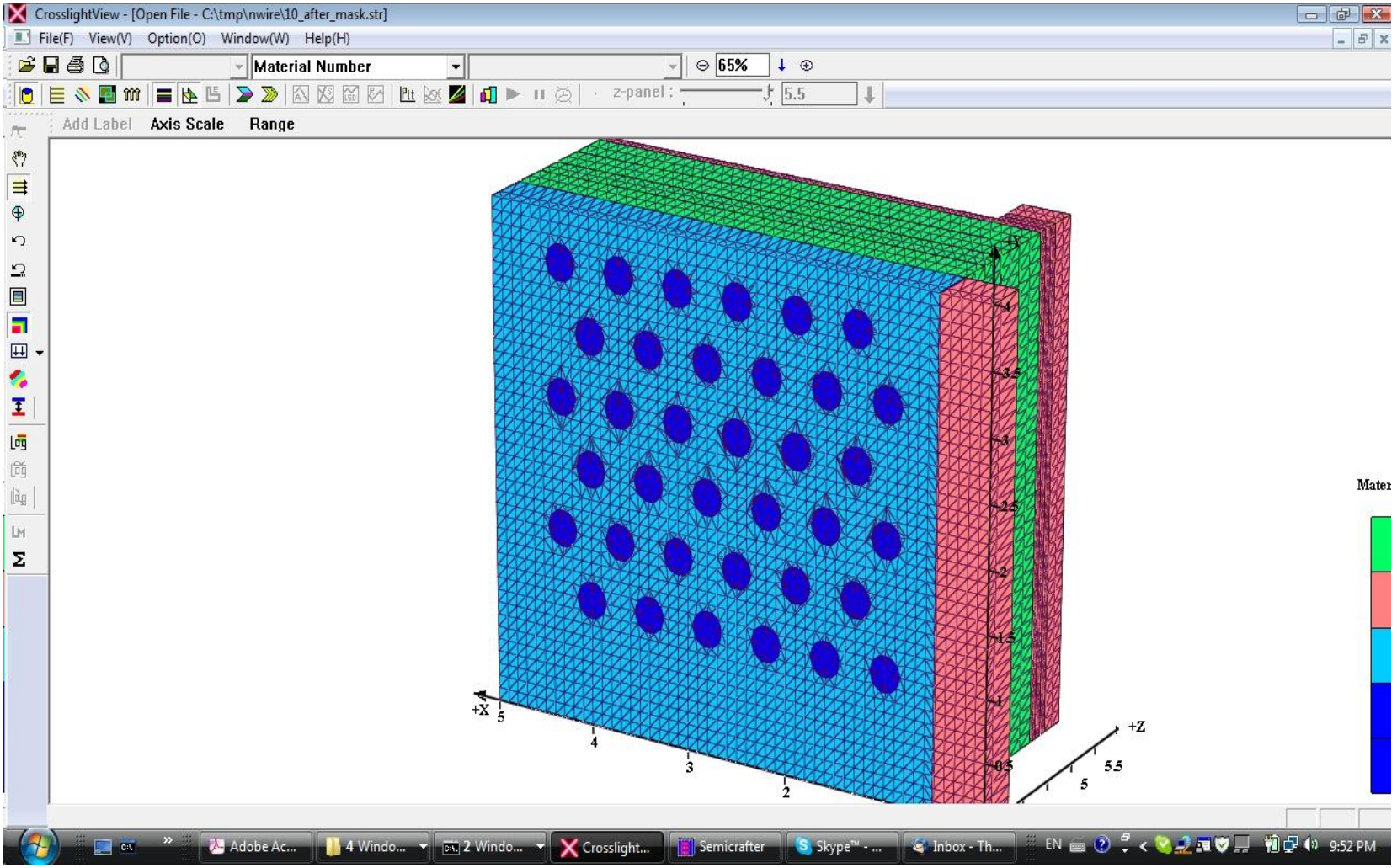
# SemiCrafter example:
# Final structure of nano-wire PhC LED



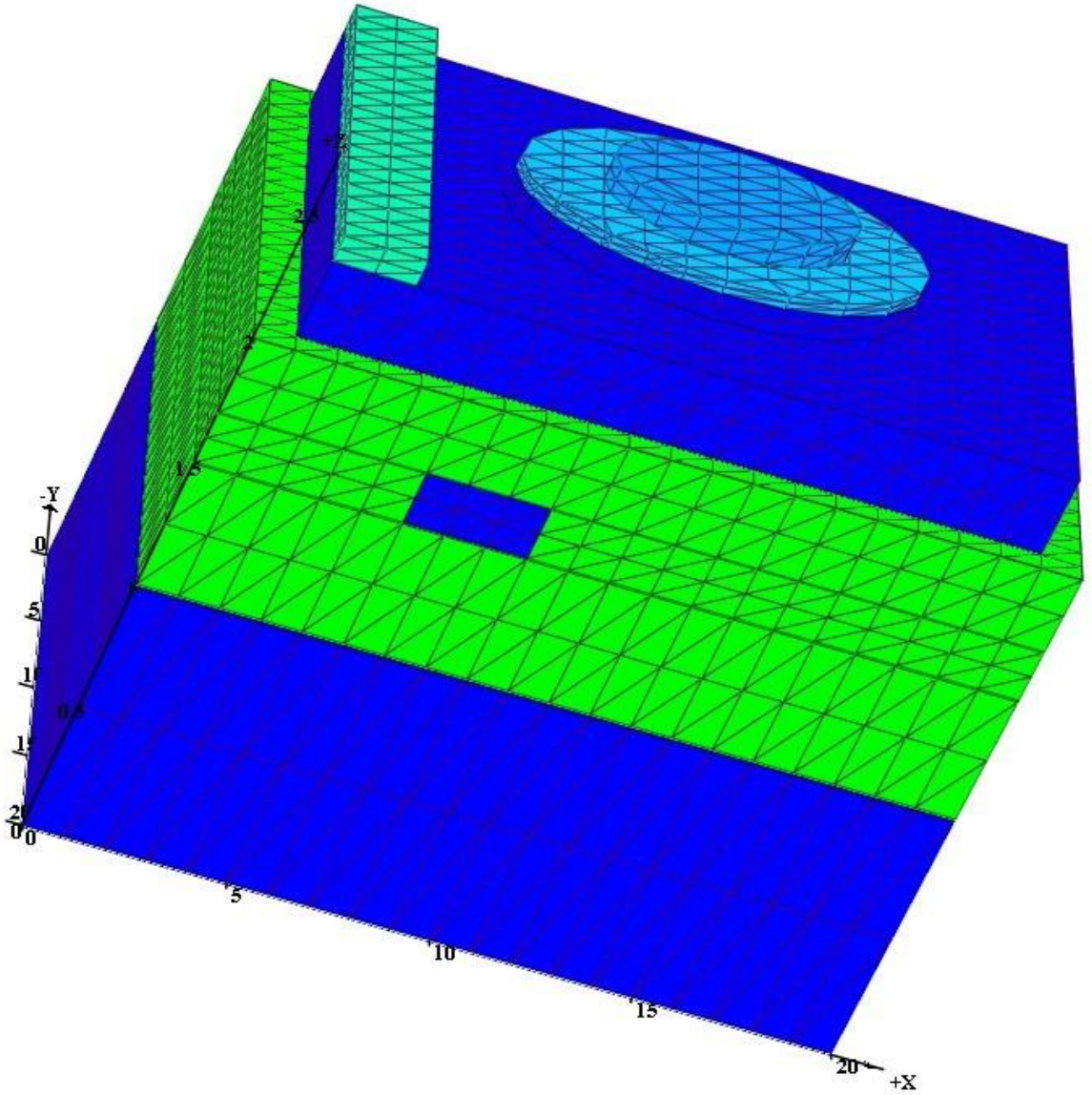
# SemiCrafter example: Mesh of nano-wire PhC LED



# SemiCrafter example:
# Inside mesh of nano-wire PhC LED



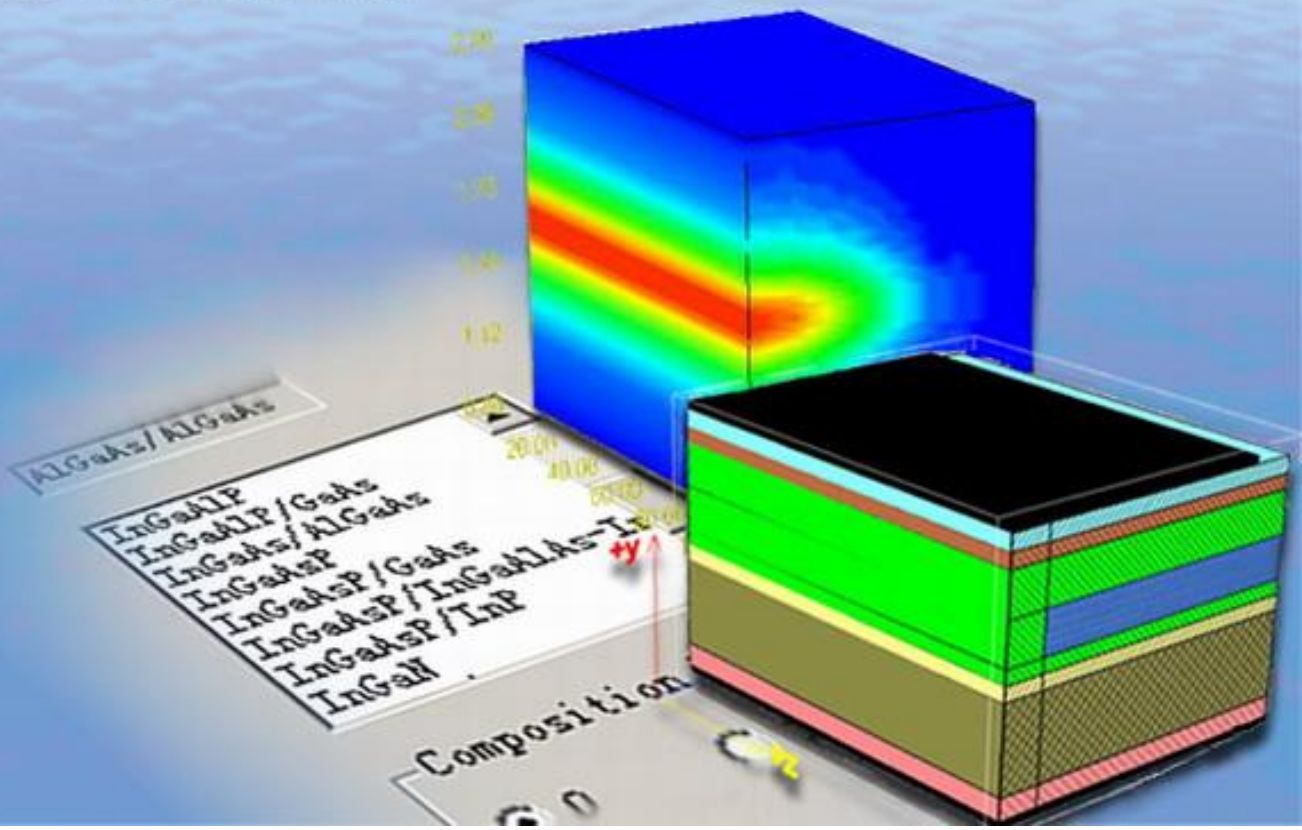
# SemiCrafter example: Micro-disk laser



# About Crosslight

- A leading TCAD provider since 1993
- Complete product portfolio for semiconductor device simulation
- Innovative simulation tools to ensure a fast and seamlessly transfer from process to device simulation
- Ultra efficient 3D structure combined with powerful and easy to use 3D editor to provide class leading 3D simulation experience
- "Café-time Simulator". Windows based, user friendly graphic user interface makes simulation more enjoyable.

Creators of Award Winning Software

# CROSSLIGHT

## Software Inc.