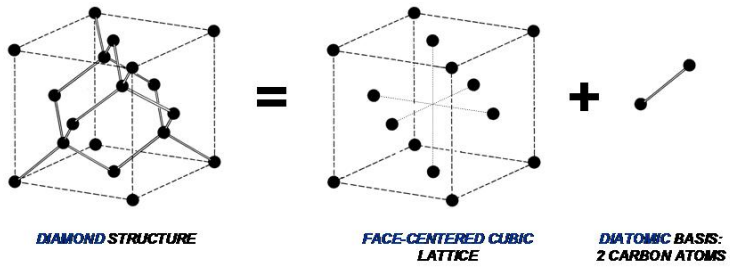
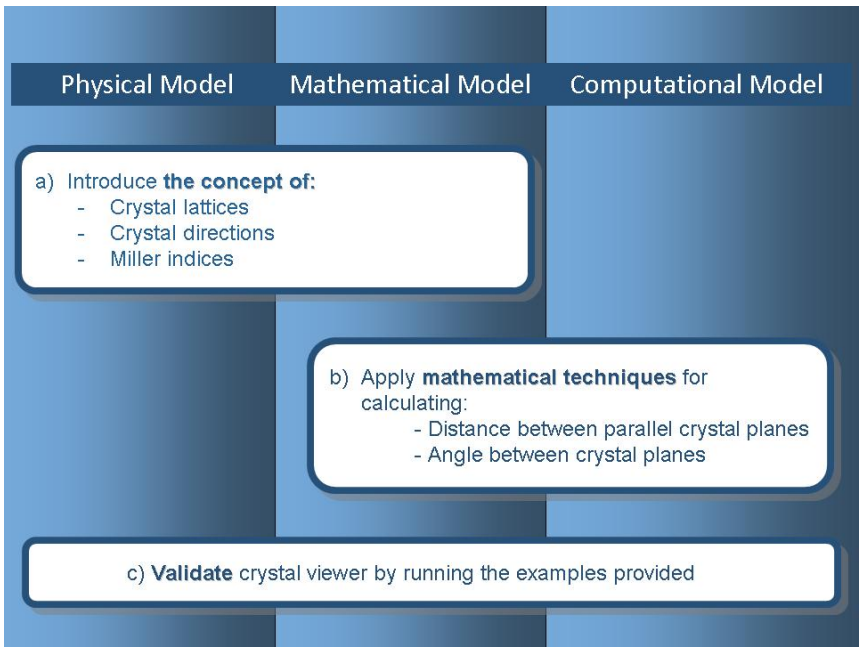
Crystal Viewer Tool Learning Materials



By completing the Crystal Viewer Lab in ABACUS - Assembly of Basic Applications for Coordinated Understanding of Semiconductors, users will be able to understand: a) crystals,b) crystal directions, and c) Miller indices.

The specific objectives of the Crystal Viewer Lab are:



Recommended Reading

Users who are new to crystal structures and Miller indices should consult the following materials:

1. Rober F. Pierret. (1996). *Semiconductor Device Fundamentals*. 2nd ed. Reading, MA: Addison-Wesley.

2. Michael Shur. (1990). *Physics of Semiconductor Devices*. Englewood Cliffs, NJ: Prentice Hall.

3. Dragica Vasileska, Stephen M. Goodnick and G. Klimeck. (2010). *Computational Electronics: Semiclassical and Quantum Device Modeling and Simulation*. Boca Raton, LA: CRC Press.

Demo

Crystal Viewer Tool: First-Time User Guide

Crystal Viewer Tool Video Demonstration

Theoretical descriptions

* Crystal Structures

* Crystal Directions and Miller Indices

* Illinois ECE 440 Solid State Electronic Devices, Lecture 2: Crystal Lattices

* ECE 606 Lecture 2: Geometry of Periodic Crystals

Tool Verification

Crystal Viewer Tool Verification (V 2.3.4)

Examples

1. Crystal Viewer Demonstration: Bravais Lattices

2. Crystal Viewer Demonstration: Bravais Lattices 2

3. Crystal Viewer Demonstration: Various Crystal Systems

Exercises and Homework Assignments

1. Homework Exercise on Bravais Lattices, Crystal Structures, Miller Indices

2. Exercise: Crystal Lattices

3. Illinois ECE 440: Introduction to Crystal Properties Homework

4. ABACUS Exercise: Crystal Lattices and Miler Indices

Solutions to Exercises

Solutions are provided only to instructors!

Evaluation

This test will assess the users conceptual understanding of the physical, mathematical and computational knowledge related to the identification of crystal structures and the calculation of Miller indices.

ABACUS: Test for Crystal Viewer Tool

Challenge

Users are challenged to integrate what they have learned about crystal lattices.

Crystal Structures - Packing Efficiency Exercise