



# EE236 Electronic Devices Lab

## WADHWANI ELECTRONICS LABORATORY

### Lab 0 Introduction to Nanohub

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# 1 Introduction to Nanohub

## 1.1 What is nanohub

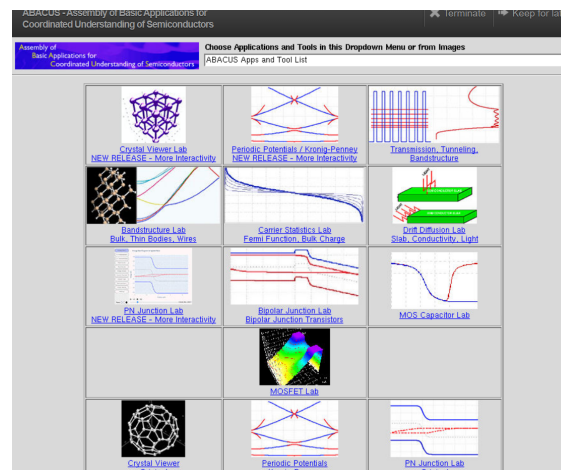
Nanohub is a website developed by Purdue University used for various scientific computational tasks, from Electrical Engineering to Biology and other fields of science. It can be directly accessed from the web browser without any need for additional installation. The users can create a free account on its website and make use of the various tools available in it.

## 1.2 Role of Nanohub in EE236

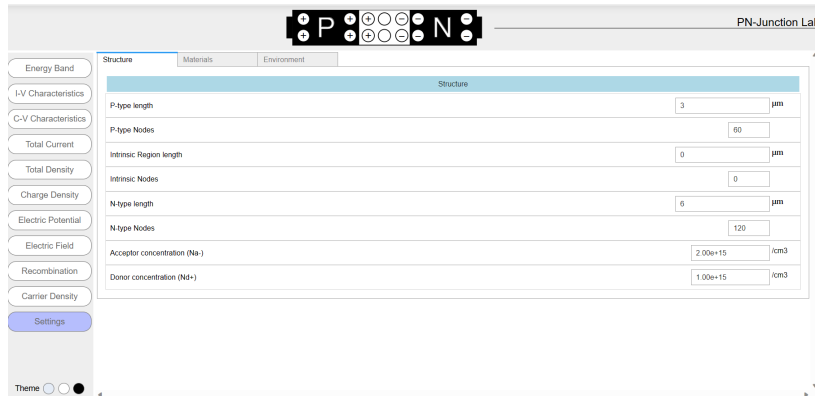
By introducing nanohub simulations in this course, we hope to relate various experiments that will be performed in the lab to the background physics of the device, verify the results obtained in lab, observe the changes obtained in the results from altering various device parameters, changing the material, changing the environmental conditions and in general getting a feel of how device simulations are performed and how they're different from circuit simulations.

# 2 Getting started with nanohub

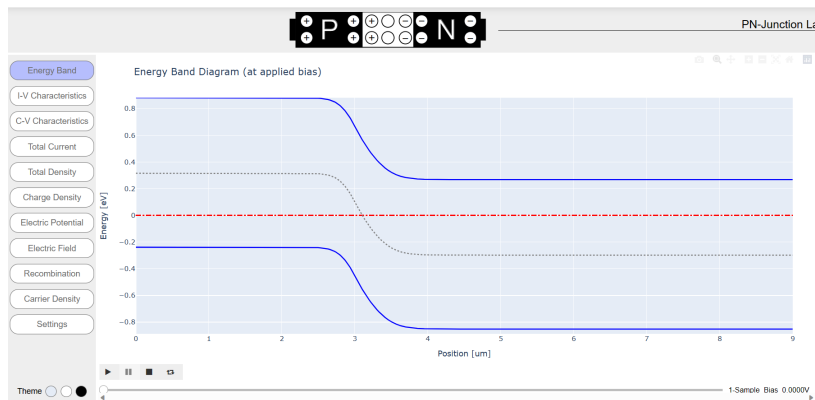
- Visit the website (<https://nanohub.org/>) and create an account.
- Login and from the tools section, search for the following tool ABACUS, and launch it or alternatively use the link (<https://nanohub.org/tools/abacus>).



- For this introductory session we will make use of the PN junction lab. Inside the ABACUS assembly, open the newer or the older version of the PN Lab.
- Here you can observe a GUI based interface, and in the settings tab you can alter the basic properties of our device, its physical parameters, material parameters and the environment



- To observe the Bandgap of this said diode, you can alter the applied voltage using the slider below and note down your observations



You will be using various tools during the lab in your experiments but the interface would be similar for most of them.

## 3 Experiment

### 3.1 Simulation Exercise for Lab 0

For this simulation exercise, use the PN Junction Lab. Take graphs for the following quantities:

1. Energy Band Diagram
2. Electric Field
3. Charge Density
4. Total Density

- Change the Bias voltage so that the device is now in non-equilibrium.
- Observe the changes in the quantities mentioned and try to explain them.