Lab #1:
Lab Tour, Safety Quiz, Label Wafers, Measure Sheet Resistance

Read all the handouts before the Labs. Follow all Laboratory Safety Rules

Purpose:

Overview of:

- cleanroom environment and operation
- personal protective equipment and safety rules
- the processing equipment.

At the end of this Lab, you will take a quiz and you have to answer all the questions correctly before you can start processing in the Lab.

You will also label your own device wafer and the group's monitor wafers, and measure the resistivity of the wafers using 4-point probe.

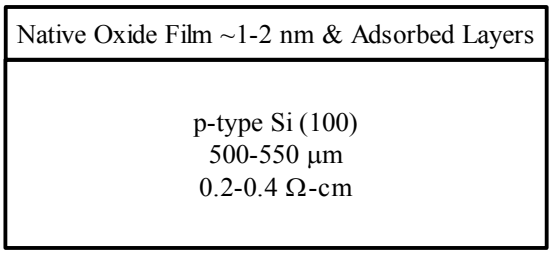
Process Steps:

Wafers: 4" diameter; Substrate: Boron doped Si (100), 0.2-0.4 Ω-cm, 500-550 μm thick.
1 device wafer for each student; 10 monitor wafers for each group; label all wafers.

Details will be provided during the lab session. Record all details along with any results, measurements, or other observations on clean room paper provided in the Lab (You cannot bring any notes or notebook into the Lab).

1. Each student in the section gets his/her own number. Following the numbering scheme given in the lab to insure that you can follow your wafer through processing consistently.
2. Obtain your device wafer and monitor wafers from lab instructor. Label all the wafers on the lid of the containers and the back of the wafers with (section #-wafer #). Carefully follow the instructor's instructions on lightly scribing the numbers on the wafer backs to avoid breaking the wafer.
3. Measure wafer sheet resistance (in Ω/square) with 4-point probe for all the wafers. The probe spacing is 62.5 mil (1 mil=10^{-3} inches, 62.5 mil=1.59mm). Convert the sheet resistance to resistivity in Ω-cm and doping concentration in cm^{-3}. Compare the measurements with the manufacturer's specifications. For one of the wafer, measure the uniformity of the sheet resistance across the wafer by taking at least 5 measurement points. (Read p. 5-6, 52-54 in text)

LAB #1 Summary
LAB TOUR, SAFETY ORIENTATION, LABEL WAFERS, AND SHEET RESISTANCE MEASUREMENTS



Wafer Cross-Section

- **Cleanroom Environment and Personal Protective Equipment**
- **Label wafers and wafer boxes**
- **4 Point Probe Measurements**
- **Calculate Doping Concentration and Resistivity from Sheet Resistance**
- **Determine Doping Uniformity across Wafer and among Wafers**

INFORMATION TO BE INCLUDED IN LAB REPORTS

1. Measured sheet resistances and approximate locations of each measurement on the wafer.
2. Convert the measured sheet resistance to resistivity in Ω-cm and doping concentration in cm^{-3}. Analyze the mean and the standard deviation of the doping concentration measured. Determine the doping uniformity across your device wafer and among 4 different wafers. Compare the results to the manufacturer's specifications.