MATE 510 Materials Analysis **Winter 2012**
Virtual SIMS Lab Report

Format
Write your report in a memo format (Date:, To:, From: and Subject:) include page numbers and your name on each page. Please include data and graphs within the body of your report and properly label Figures and Tables. Write in the first person past tense and use a narrative style (like you are telling a story); do not use bullets. Please submit a soft copy (pdf or doc format please) via email and make sure you last name is in the filename.

Deliverables
Please compose a **Materials Analysis Report** that summarizes the following: 1) objective of the analysis, 2) experimental conditions utilized to solve the problem, 3) discussion of data/results and 4) conclusions.

Background information on the diffusion of dopants into silicon to form pn-junctions can be found in any MATE210 book (Smith 5th Ed. Chapter 14) or Campbell (posted on PolyLearn). The MATE435 Microfab class processed the silicon wafers for either PMOS or SOLAR devices. The PMOS process involved a predeposition (1050 ^{o}C) of Boron into n-type silicon for 90 minutes. The SOLAR process included both a predeposition (1050 ^{o}C) of Phosphorous into p-type silicon and a drive in step (1050 ^{o}C) for 50 minutes. One other value you need is the resistivity of the original n-type and p-type silicon which was 5 ohm-cm before being doped. Using your background on diffusion (see end of slides on SIMS from lecture) you should be able to calculate the diffusion depth that each of these processes would yield. By analyzing the data we obtained from the SIMS instrument at UCSB what junction depths did each of these processes produce and how do they compare with your calculated values?
In your experimental conditions section make sure to identify what ion peaks were detected for the dopants; what type of primary ion beam was utilized and what was the ion flux? What type of mass analyzer was employed and what was its resolution. What RSF did you employ to compute concentration (atoms/cm^3) versus depth (μm)?

Also include a section at the end of your report that reflects on how the virtual lab experience enhanced your learning of SIMS as a material analysis technique; any recommendations for improving the experience would be appreciated.