HOMEWORK 1
Making an Image in Photoresist
DUE: Tuesday, Oct. 14, 2008

Homeworks may be submitted electronically to
hu@ece.ucsb.edu

Obtain a piece of single-crystal Silicon wafer. THE CRYSTALLOGRAPHIC ORIENTATION AND DOPING OF THE WAFER ARE NOT IMPORTANT.

1. Prepare (clean) the wafer using the standard procedure listed in the Teaching Cleanroom.
2. You will use a MASK for the CONTACT ALIGNER that will be provided by Bob Hill.
3. Apply **4210 resist** to your silicon sample(s), expose and develop your samples using the standard process conditions available in the Teaching Cleanroom (also to be posted on the Class website).
4. Take an optical photograph of your sample that will indicate, as well as possible, the dimensions of the features patterned into photoresist and the *quality* of the pattern.
5. Use the DEKTAK to provide information on the shape (profile) of the photoresist pattern.
6. Etch your samples in a solution of HF and HNO_3 (to be prepared for you) for about a minute, then repeat steps 4 and 5.

Write an analysis of the lithographic patterns that you have produced, including photos and Dektak data in your write-up. How would you rate the quality of your patterns? What parts of the process were hard to control? Are there any procedures that you would change or concentrate on further the next time you do this procedure? Did the photoresist hold up to the etching process?

THE PURPOSE OF THIS HOMEWORK IS NOT FOR YOU TO PERFECT THE OPTICAL LITHOGRAPHY PROCESS. The main goal of this homework is for you to make your try at doing optical lithography and analyze the results and your experience. I expect that the write-up should be no more than 2 pages. The write-up should contain a short, summary description of your procedure, and should provide evidence of your insights about the process.

* You will have to be trained and checked-out on all the equipment you will need for this homework, and you will have to sign up for time on the equipment.