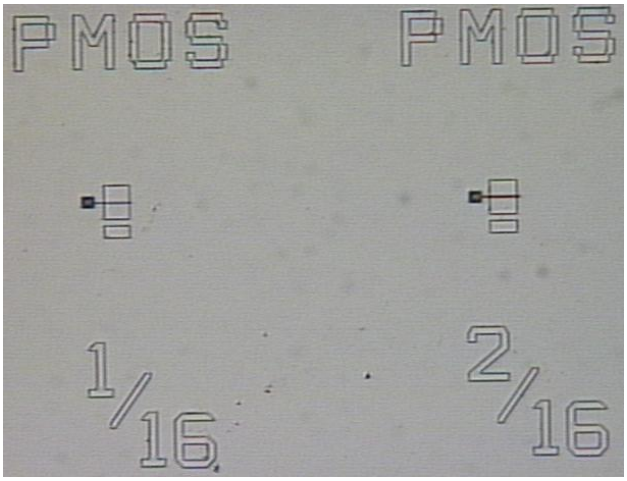
SMFL Users News Letter – Number 14020522 V6.1

This News Letter is intended to provide information of interest to MicroE faculty and other users of the SMFL. It is a report on equipment and processes used in the SMFL with emphasis on changes, problems, and details that may not be generally available to users. I distribute this to the MicroE faculty and others. If you feel that this News Letter has some information that might be useful to your graduate students please forward it to them. Past newsletters are posted on Dr. Fuller's webpage.

ASML Double Exposure:

We were interested in making our poly gate lengths smaller without making new masks. We were successful using the ASML stepper and doing double exposure of the poly level. The details of and results are available on my webpage. Please see: http://people.rit.edu/lffeee/DoubleExposure.pdf

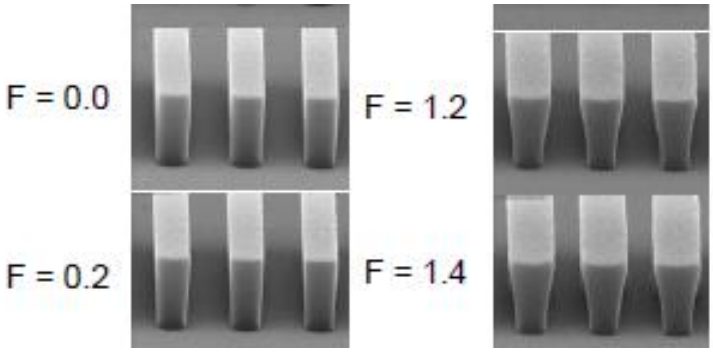
Shift Amount (µm)	Transistor Gate L/W (µm)	Measured Gate Length (µm)
0.5	1/16	0.5
0.5	2/16	1.5



This example shows a shift of 0.5um reduces the gate length by 0.5um.

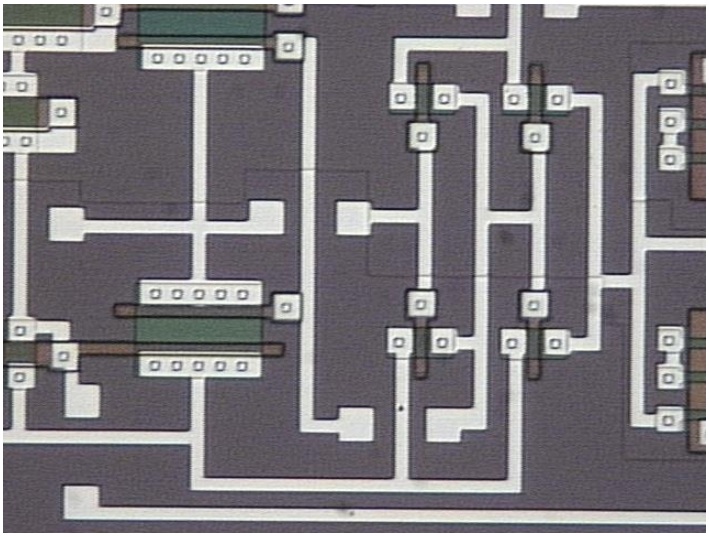
Lift-Off using the ASML:

Lift-off is a good technique to pattern materials that are hard to etch. The key to lift-off is to get an undercut in the photoresist image such as shown here with a focus offset of 1.4.



The ASML stepper measures the top surface of the wafer (top of the photoresist) for each exposure and then sets the distance between the lens and the top of the wafer to a value previously determined as the best focus for the nominal coat and develop recipes. The user of the ASML can introduce a focus offset in micrometers. A positive number reduces the distance between the lens and the top of the wafer.

We have used this technique for a lift-off process using nLOF 2020 image reversal resist. We set the focus offset to 1.5um so that the top of the photoresist is not in focus (a little out of focus.. ie bigger). Since the resist is image reversal the expose resist remains after develop resulting in the resist feature being bigger at the top of the resist than at the bottom of the resist. The process works well and is described in a document on my webpage: http://people.rit.edu/lffeee/steppers.htm



2um Wide, 5000Å Thick, Aluminum Traces Defined by Lift-Off