MEMORANDUM

To: Bill Flounders, Executive Director NanoLab
From: **Sia Parsa**, Process Engineering Manager
Subject: 2011 Year-End Report
Date: 31 August 2011

I. OVERVIEW

I supervise the process engineering group In NanoLab comprised of 4 process engineers (one baseline engineer), and average of three lab assistants (undergraduate students). This memorandum summarizes our activities for the period of January 1, 2010 through June 30, 2011.

It has been extremely busy year and half sustaining our normal operation, while finishing up the move over to the new Marvell NanoLab. This involved working from two locations and major challenges faced by the installation and release of variety of equipment In the new lab that included Tystar furnaces (additional new bank), five new RIE and DRIE etchers, a new ASML DUV stepper and variety of sinks and support equipment in the NanoLab. We continued our regular training classes on Crestec E-beam writer, offered additional training on newly installed equipment such as Headway spinners, sinks, ASML machine and bottle washer. MEMS-Exchange and ETR runs were also handled well in the mist of all these activities generating good revenue for the new lab.

The following summarizes Process Engineering activities.

II. New Lab Preparation/Support

- Process staff got involved in many aspect of the planning and execution of the Microlab move over to new NanoLab. Gas hook up documentation by Attila Szabo facilitated equipment reinstallation in the new lab, various sinks and their locations, as well as their functions were discussed and finalized in our process and operation meetings. The sink summary table (currently a manual chapter) was generated to correlate NanoLab Misnks to old Microlab sinks. The sink type, function and physical layouts (CAD in PDF format) for each sink was established before ordering them. These information was used to place order to WAFAB the vendor company that fabricated our new sinks.
- ASML stepper required a lot of planning and site preparation.
  - ✓ Site and facility evaluation by ASML crew on (01/28/2010)
  - ✓ First ASML test mask fabricated in advance of tool installation (04/06/2010)
  - ✓ Laser beam uniformity in spec, focus & red/blue tests to follow (06/09/2010)
- SVG Developer tank box was designed and submitted to machine shop aimed at organizing the developer tanks in chase 383 of the Nanolab. Looks Great!
- Sinks required a lot of planning at the early stages involved lay out, material selection, and process assignment, later fabrication and follow up to installation that was critical. Labware, chemical management and finally member training were important parts of the release process. Each sink was released with designated cassette set (engraved sink name on the cassettes accompanied by handles), designated StatPro1000 antistatic and regular white PFA cassettes depending on sink type and function.

III. TRANSFERRED AND NEW EQUIPMENT INSTALLATION IN NANOLAB

Process staff generated on-line manuals for newly installed & transferred equipment in the NanoLab, also evaluated and released standard processes on baseline tools, helped members continue their process on other equipment in the lab. These activities involved release of standard recipes on Lam etcher, Tystar furnaces, as well as stepper jobs for ASML and GCAWS steppers. Matt Wasilik our BSAC engineer helped us release standard etch processes on the new DRIE STS machines. He worked with graduate students (Fabian Goerick) to qualify aluminum nitride deposition process in our newly installed AlN machine, also helped us release flip chip bonder, Ks aligner and KS bonder in the new lab.

ASML stepper 5500/300 (new tool)

Careful site preparation and planning was warranted in the installation of our new DUV 5500/300 ASML stepper in the NanoLab. Preemptive evaluation of in-house mask making capability was also important, lack of which could have impacted the cost of operation dramatically.

Mask generation: A four field mask was fabricated and forwarded to ASML application engineers to try at IBM San Jose. This was done prior to our stepper arrival to foresee possible mask making issues that needed to get addressed before the arrival of our new ASML 5500/300 model stepper (5/3/10).

Training: Two Training sessions were offered to retrain qualified users of the previous model stepper (5500/90) on the new 5500/300 model (01/06/2011 and 01/12/2011). Process staff also helped members redesigned their mask onto the new 4X template currently posted on line, all went extremely well thanks to everyone's cooperation.

Lens Qualification: A critical part of the stepper site acceptance involved Lens Qualification test. A complex array of features were printed and measured to rule out possible lens damage and/or inherent lens problems. ASML needed to demonstrate good process window for this particular 5500/300 stepper by meeting their specification in regards to Useable Depth of Focus (UDOF) and Critical Dimension (CD) Uniformity. This test was initiated after the stepper had gone through its initial setup/qualification and stabilized for sometimes, as a final step in the overall stepper acceptance process in NanoLab. Lens qualification utilizes focus exposure matrix (FEM) to determine Useable Depth of Focus (UDOF) and Critical Dimension (CD) Uniformity through generation of Bossung curves (spider plot or smiley plots) shown in Figure1 below. Their automated SEM was used to measure critical dimensions (CD) of printed vertical/horizontal 0.25 µm test features shot at different focus and exposure settings by the FEM procedure. The CD values that fell within specified range (0.25 µm $\pm$ 10%) were summarized in Table -1. These data were then used to generate the Bossung curves (spider plot or smiley plots) in Figure 1. Useable Depth of Focus (UDOF) = 1.1 µm (specification $\geq$ 0.7 µm) and Critical Dimension (CD) Uniformity Range = 20 nm (specification $\leq$ 30 nm) were demonstrated by the lens qualification all within spec. Please note data outside 0.25 µm $\pm$ 10% CD range were rejected as out of spec data, hence were not shown in Table1.

9263	Center		Corner 1		Corner 2		Corner 3		Corner 4		Corner 5		Corner 6		Corner 7		Corner 8		
Focus		0V	1H	1V	2H	2V	3H	3V	4H	4V	5H	5V	6H	6V	7H	7V	8H	8V	Focus
1.50																			1.50
1.40																			1.40
1.30																			1.30
1.20																			1.20
1.10																			1.10
1.00																			1.00
0.90																			0.90
0.80																			0.80
0.70																	0.274		0.70
0.60							0.263			0.240							0.276		0.60
0.50				0.244	0.240		0.258		0.257	0.257			0.240				0.260		0.50
0.40				0.241	0.234		0.256	0.262	0.258	0.252		0.245	0.246	0.256			0.261	0.261	0.40
0.30			0.244	0.247	0.249	0.238	0.258	0.268	0.259	0.257	0.236	0.245	0.249	0.253	0.234		0.263	0.262	0.30
0.20			0.246	0.255	0.249	0.241	0.258	0.265	0.261	0.260	0.240	0.251	0.250	0.254	0.241	0.240	0.262	0.255	0.20
0.10	0.231	0.227	0.253	0.248	0.250	0.243	0.256	0.266	0.260	0.258	0.250	0.248	0.250	0.257	0.248	0.245	0.259	0.263	0.10
0.00	0.235	0.235	0.250	0.253	0.252	0.253	0.258	0.261	0.259	0.261	0.251	0.254	0.253	0.256	0.249	0.247	0.258	0.256	0.00
-0.10	0.240	0.236	0.251	0.254	0.252	0.248	0.260	0.260	0.260	0.258	0.253	0.255	0.252	0.255	0.248	0.248	0.262	0.255	-0.10
-0.20	0.240	0.239	0.249	0.254	0.252	0.249	0.259	0.259	0.258	0.259	0.253	0.253	0.251	0.255	0.251	0.250	0.261	0.255	-0.20
-0.30	0.242	0.242	0.252	0.255	0.250	0.249	0.259	0.260	0.259	0.258	0.253	0.255	0.252	0.256	0.249	0.250	0.261	0.257	-0.30
-0.40	0.243	0.243	0.251	0.254	0.250	0.250	0.259	0.258	0.257	0.259	0.252	0.255	0.252	0.256	0.251	0.249	0.262	0.256	-0.40
-0.50	0.244	0.243	0.252	0.253	0.251	0.252	0.259	0.259	0.258	0.260	0.253	0.256	0.252	0.255	0.250	0.250	0.263	0.257	-0.50
-0.60	0.244	0.243	0.251	0.253	0.251	0.250	0.260	0.259	0.258	0.259	0.253	0.255	0.253	0.256	0.251	0.251	0.265	0.258	-0.60
-0.70	0.244	0.244	0.251	0.257	0.252	0.250	0.264	0.260	0.260	0.262	0.254	0.256	0.253	0.257	0.251	0.252	0.268	0.258	-0.70
-0.80	0.244	0.242	0.256	0.254	0.247	0.250	0.259	0.264	0.261	0.264	0.258	0.258	0.253	0.257	0.252	0.252	0.269	0.262	-0.80
-0.90	0.241	0.242	0.258	0.258	0.247	0.250	0.258	0.264	0.261	0.267	0.255	0.261	0.250	0.257	0.246	0.249	0.268	0.265	-0.90
-1.00	0.235	0.238	0.251	0.253	0.243	0.248	0.250	0.267	0.260	0.271	0.256	0.259	0.249	0.256	0.247	0.248	0.272	0.266	-1.00
-1.10	0.231	0.234	0.250	0.261	0.240	0.246	0.245	0.266	0.260		0.251	0.264	0.232	0.255	0.239	0.244	0.276	0.271	-1.10
-1.20			0.250	0.258		0.231		0.267	0.260		0.250	0.261		0.255		0.234		0.271	-1.20
-1.30			0.239					0.267	0.233		0.243	0.268		0.250				0.273	-1.30
-1.40											0.246			0.247					-1.40
-1.50																			-1.50
		0.000		-0.003		-0.001		-0.004		-0.002		-0.003		-0.003		0.002		0.001	
BF	-0.5	-0.5	-0.5	-0.35	-0.3	-0.45	-0.25	-0.45	-0.4	-0.2	-0.55	-0.45	-0.3	-0.5	-0.4	-0.5	-0.2	-0.45	**BF**
DOF	1.2	1.2	1.6	1.7	1.6	1.5	1.7	1.7	1.8	1.6	1.7	1.7	1.6	1.8	1.4	1.4	1.8	1.7	**DOF**
IDOF	1.2		1.5		1.4		1.5		1.5		1.6		1.5		1.3		1.5		**IDOF**
CD@BF	0.243	0.243	0.251	0.25	0.25	0.25	0.259	0.258	0.257	0.259	0.252	0.255	0.252	0.256	0.251	0.249	0.262	0.256	**CD@BF**

Table 1- FEM test results for lens qualification test (X= energy and Y=focus)

SEM measurement data (CD's) were then plotted in figure 1 to show this particular lens met specified CD uniformity and focus requirement of the lens qualification test.

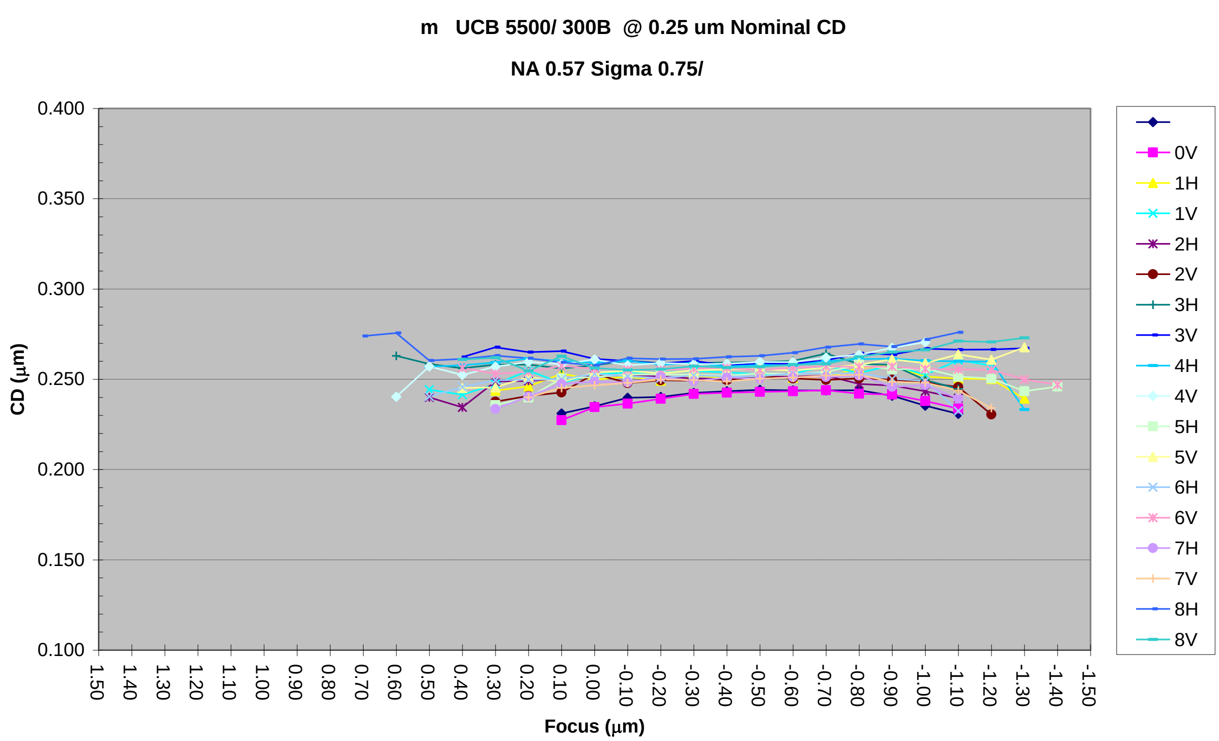


Figure 1- Bossung curves, CD variation as a function of focus and exposure energy

Software Upgrade: Request was made of the ASML application manager to explore possibility of installing all the available software options on our ASML 5500/300 stepper. This took a while and fortunately ASML upper management graciously agreed to have all additional available options that did not originally come with the tool installed, listed below.

9428.999.75780 - Test Streaming UF
9428.999.67050 - 3" Handling UF
9428.999.79100 - Thickness range offset UF
9428.999.62310 - Job creator UF
9428.999.62500 - Focus spot monitor UF
9428.999.76510 - Ext Exposure Trans UF
9428.999.75450 - Productivity Performance Monitor
9428.999.67130 - Multiple Exposure Technique
9428.999.12120 - Compound Image Design
9428.999.12139 - Equipment Constants
9428.999.62790 - Metrology Data Interface
9428.999.76410 - Universal Pre-aligner
9428.999.75880 - Shifted Measurement Position

Sinks Release (New tools)

Just about all of our sinks were new orders for the NanoLab. MSink6 and Msink8 were among the first new sinks installed. Excellent planning and execution ensured timely installation of these two sinks, hence no interruption in the furnace operation and their transition into the NanoLab. Msink1, Msink3, Msink16 and Msink18 were the other early sinks to arrive making lithography migration and the old lab operation transfer possible in NanoLab (Room 582A NanoLab).

02/17/10 - Msink6 and Msink8 released
05/03/10 - MSink16 and Msink18 released

Furnace and support equipment release in the NanoLab (Transferred Tools)

While in transition we often had to perform pre-furnace cleaning in the Microlab, and then transfer these wafers in a designated 4" or 6" statPro cassettes over to available furnaces in the NanoLab. This situation eventually came to an end, as more and more furnaces were installed in the new lab.

02/16/10 - Tystar3 and Tystar 4 were released in the NanoLab. Members performed their pre-furnace clean step in the Microlab up until the time Msink6 and Msink8 became available in NanoLab.
02/16/10 - Msink6 SRD released
03/30/10 - Tystar9 furnace was released based on 4" and 6" test run results showing deposition rate, thickness uniformity and index of refraction of the nitride film on par with the historical data collected on this tool at its previous location.

<u>4" average deposition rate and film thickness uniformity</u>
Deposition Rate = 49.5A (load), 45.5A (Center), and 40.2A (pump)
Within the wafer uniformity = 3.1% (load), 4.2% (Center), and 4.2 (pump)

<u>6" average deposition rate and film thickness uniformity</u>
Deposition Rate = 38.0A (load), 31.1A (Center), pump not measured

Within the wafer uniformity = 3.1% (load), 2.8% (Center)

Lam etchers release in the NanoLab (New Tools)

Lam6 RAINBOW ETCHER START UP AND RELEASE

Lam6 is our new dedicated oxide etcher that can also etch nitride film with patterned resist down to half micron minimum feature sizes. Process characterization started by chamber preparation that involved cycling 100 dummies through the standard oxide etch process. This seasoned the chamber also highlighted flat finder, HBr MFC and end point detection issues that had to promptly get addressed, before moving onto process optimization and release of the tool on 06/02/10.

Lam6 Oxide Main Etch Test Results
Oxide etch rate/min: 4622A/min
Average within wafer non-uniformity ~ 1%,
Selectivity to: Poly = 9.6, Nitride=1.7, PR=6.2

Lam6 Oxide Overetch Test Results
Oxide etch rate/min: 4396A/min
Average within wafer non-uniformity ~ 2%,
Selectivity to: Poly = 12.8, Nitride=2.9, PR=7.6

Lam7 START UP RELEASE

Lam7 our new Transformer Coupled Plasma etcher was initially released as a poly etcher on 03/23/10, later converted back to serve its original intended function as a metal etcher on January of 2011. This TCP metal etcher is capable of etching sub half micron feature sizes currently in service as our main metal etcher in the NanoLab. Summary of process characterization results as a poly etcher and again as a metal etcher are listed below.

Lam7 Poly-silicon Etch StartUp Data:

Main Etch Test Results
Poly etch rate/min: 3641A/min
Average within wafer non-uniformity ~ 1%,
Selectivity to: oxide = 6.8

Overetch Test Results
Poly etch rate/min: 1607 A/min
Average within wafer non-uniformity ~ 12%
Selectivity to: oxide = 125.6

Lam7 Metal Etch StartUp Data:

Main Etch Test Results
Aluminum etch rate/min: 4371 A/min
Average within wafer non-uniformity ~ 4%,
Selectivity to: oxide = 2.6

Over etch Test Results
Aluminum etch rate/min: 3433 A/min
Average within wafer non-uniformity ~ 10%
Selectivity to: oxide = 1.9

Lam8 START UP RELEASE

Lam8 our new Transformer Coupled Plasma etcher dedicated poly-silicon etcher. Initial issues with the installation were quickly resolved and the tool was released late October 2010.

1. Bias RF power gives 10X power when the setting is below 120W.
2. The actual HBr and Cl2 flows are reversed.
3. The endpoint detection runs upward instead of downward when Silicon is etched away.

Lam8 Poly-Silicon etch Star Up Data:

Main Etch Test Results
Poly etch rate/min: 3158 A/min
Average within wafer non-uniformity ~ 7%,
Selectivity to: oxide = 10

Overetch Test Results
Poly etch rate/min: 1303 A/min
Average within wafer non-uniformity ~ 3%
Selectivity to: oxide = 315

AMAT CENTURA Epi PRELIMINARY PROCESS WORK AT STANFORD (New Tool)

Introductory training at Stanford was offered to our designated engineers aimed at starting up the preliminary work needed for facility planning, gas connection and process requirement of the new AMAT Centura Epi machine in the NanoLab. This tool is slated to get installed during upcoming months.

- Equipment training provided to Attila Horvath by Stanford engineer in charge of their Epi machine, SNF lab on 04/19/10.

Room 582A, and Other Areas Equipment Release (New/Transferred tools)

- New Headway1/2 spinners were released after spin programs were installed and member trainings were concluded by process staff (2 training sessions).
- A New resistivity measurement tool (CDE ResMap) was donated and installed in the NanoLab by Creative Design Engineering (Dr. David Cheng). This is a semi-automated Four Point Probe machine capable of measuring sheet resistance of a thin film or the bulk resistance of a wafer/sample.
- A new Stoke Ellipsometer that has no moving parts and/or modulator was installed.
- NRC – Sputtering materials were ordered for NRC evaporator at its new location (NanoLab), also ITO process was checked against the baseline data from Microlab.
- V401 and Edwards evaporator were checked and released.

– Wafer saw, AMST MVD, Misnk16 and Msink18 were also checked and released

IV. PROCESS DEVELOPMENt, SUSTAINING AND IMPROVEMENT ACTIVITIES

SIC Process

The new Methylsilane (CH3SIH3) based silicon carbide recipe in Tystar15 was closely examined then used for an ETR run. Process parameters, resistivity for a 600nm thick SiC film on 100nm oxide, and film stress for a thinner SiC film (240nm) were measured on two N-type doped SiC samples, results listed below.

Process Parameters:
Recipe name: 15CH6SiA
DCS = 3 sccm (15 sccm in the recipe)
NH3 = 1.5 sccm
Pressure = 170 mTorr
Temperature = 800 ºC

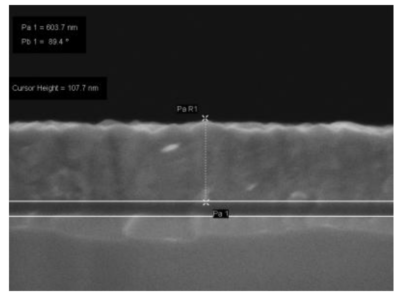


Figure 2 SEM of this SiC film on 100nm oxide

Measurement data for two SiC coated wafers (1000A SiO2)		
	Test wafer 1	Test wafer 2
Avg. Thickness (Å)	6564 Å	6496 Å
Non-uniformity (%)	0.6 %	0.55
Rs (Ω/sq)	109.2	107.2
Resistivity (Ω-cm)	7.1×10^{-3}	6.96×10^{-3}
Stress of a 2400A SiC film (MPa)	277	254

Note; 1cm = 10^{-8} Å

HTO Process

A new viable High Temperature Oxide (HTO) process was implemented on our Low Stress Nitride (LSN) furnace in late summer. Addition of cooling flange designed and fabricated by the equipment group/machine shop helped us push up the process temperature making a 2.5X oxide deposition rate increase possible in Tystar17. This was a collective effort expended by the equipment engineering, machine shop, process engineering and Professor Nguyen's group that resulted in a perfectly successful process on the first trail.

Old HTO process: Pressure=600mTorr, N2O=140, DCS=60sccm, and process temperature = 835 ºC had a deposition rate of ~ 21 Å/min

New HTO Process: Pressure=400mtorr, N2O = 180 sccm, DCS=60sccm, and Process Temperature =910 ºC/915ºC/920 ºC/ 925 ºC/ 930 ºC (5 zones- tilted profile) resulted in deposition rate of ~ 55 Å /min, The film stress was also measured ~160 MPa (compressive)

<u>New Qualification Tests</u>
New qualification test for Headway1&2 spinners
New Qualification tests for Msink1/2/3, Msink4, Msink6, Msink8 and Msink16/18
New Qualification tests for Lam6, Lam7 and Lam8
New Qualification tests for STS2, and STS-oxide
New Qualification tests for AlN2

<u>New Manual Chapters</u>
Chapter 2.02 - New Sink Summary Chapter (12/29/10)
Chapter 2.1 - New Msink1 PR Strip & Pre-Furnace Metal Clean Sink (12/20/10)
Chapter 2.2 - New Msink2 PR strip sink & General Purpose Sink (04/25/11)
Chapter 2.3 - New Msink3 Manual Spin Coat & Develop Sink (11/20/10)
Chapter 2.4 - New Msink4 TMAH/KOH Sink (11/30/10)
Chapter 2.5 - New Msink5 HF Release Sink (04/29/11)
Chapter 2.16 - New General Purpose MSink16 (03/01/11)
Chapter 2.18 - New General Purpose MSink18 (03/01/11)
Chapter 4.19 - New ASML DUV Stepper Model 5500/300
Chapter 4.28 - New Headway Manual Load Photoresist Spinner at msink3 (11/19/10)
Chapter 6.05 - New AlN2 Endeavor AT chapter (07/13/10)
Chapter 7.11 - New Lam6 Oxide Rainbow Etcher (06/25/10)
Chapter 7.12 - New Lam7 Metal TCP Etcher (06/25/10)
Chapter 7.13 - New Lam8 Poly-Si TCP Etcher
Chapter 7.22 - New STS2 Poly-Si ICP DRIE Etcher
Chapter 7.23 - New STS-Oxide (05/02/11)
Chapter 8.26 - New Keyence Digital Microscope (02/20/10)
Chapter 8.35 - New Gaertner Stokes Ellipsometer (01/18/11)

<u>Updated Manual Chapters:</u>
Reviewed/updated the rest of the chapters (over130 transferred equipment) to NanoLab.

Process Monitoring, Equipment Training, Member Qualification, and Test Grading

Our student helpers continued their excellent service and support of the NanoLab by responding to equipment move related requests, preparing dummy wafers at different stations, cleaning boats in furnaces, as well as running test monitors on our baseline tools as they became available in the new lab (NanoLab). Jimmy has directly managed their activities in the lab, and provided excellent support/training to our new student hire.

A large number of equipment qualifications were performed this past year, written tests (graded), and oral tests were given by staff for a number of tools. The BSAC and baseline engineers also provided great support in the DRIE etch, metrology, and CAD layout/ mask making areas. I assigned superusers on various tools and helped administration staff reinstated some of our members on their expired equipment qualification, also revised equipment test and added new ones when applicable.

V. PROCESS STAFF SUPERVISION, TRAINING AND OTHER SERVICES

Staff Supervision and the new job definition: I continued my supervision of process engineers, one baseline assistant specialist, and three undergraduate assistants working in the process group. This year I update Job Definition for every engineer in the process group mandated by UCB.

I arranged for lab member training provided by Kurt J. Lesker Company on sputter and evaporators on April 21st, 2010. This class was well received by more than 25 attendees, and a soft copy of the process part of the power point presentation was forwarded to interested individuals in the class (permitted by this company).

High School interns: Microlab was able to continue its 10 years old summer internship program with two new high school students in the summer of 2011; Marie Lu and Kate O'Brien carried out excellent projects. Jimmy Chang and Kim Chan provided training and mentorship to Marie and Kate respectively. An optimal Dual Frequency Nitride process was developed by Kate on Oxford2. Kate measured contact angles on samples prepared on various tools in the NanoLab. This also included samples with mono-molecular layer of HMDS, FOTS, and Gamma-MPS. Their experimental results were presented to the NanoLab staff and guests at the conclusion of their summer internship, now available at the following link: http://microlab.berkeley.edu/text/participants.html

Microlab, EE143 (UCB): Process staff continued their service/support of the EE143 lab by ordering new furnace boats, supplying the class with their chemical needs, and helping TAs with their poly/oxide runs.

Member advising, Help/Support of Other Universities, Institutions:

- Provided assistance/advice to a NanoLab member interested in depositing indium tin oxide (ITO) in one of our reactive thermal evaporators.
- Provided advice to UC Santa Barbara Colleague looking into acquiring a new DUV stepper.

VI. SEMICONDUCTOR PROCESSING AND SPECIAL SERVICES

ETR Services

Process staff completed 19 engineering test requests (ETRs), also accommodated special requests submitted to us by vendors who are currently providing critical support to NanoLab (2 um thick poly deposition on 6-inch Quartz wafers was done for Tystar and evaluation of B270 glass plate etching in Ptherm for RZ Enterprises, Inc). There were three low stress nitride (LSN) runs done for University of Jyvaskyla in Finland, LSN for University of Texas, an amorphous poly run for RTI. Stoichiometric nitride on small substrates for UC Santa Barbara, special request for Lawrence Livermore Lab, as well as LTO, oxidation and FOTS runs for other universities, all together generated good revenue for NanoLab. We also helped other colleagues move ahead with their research objectives/projects. This included a 700nm undoped poly run for EE146A wafers. There was a slow down in our ETR business during the move mainly in 2000, however we are recovering with around 13 ETR completed to date (09/1/11), see Figure 3 for more detail.

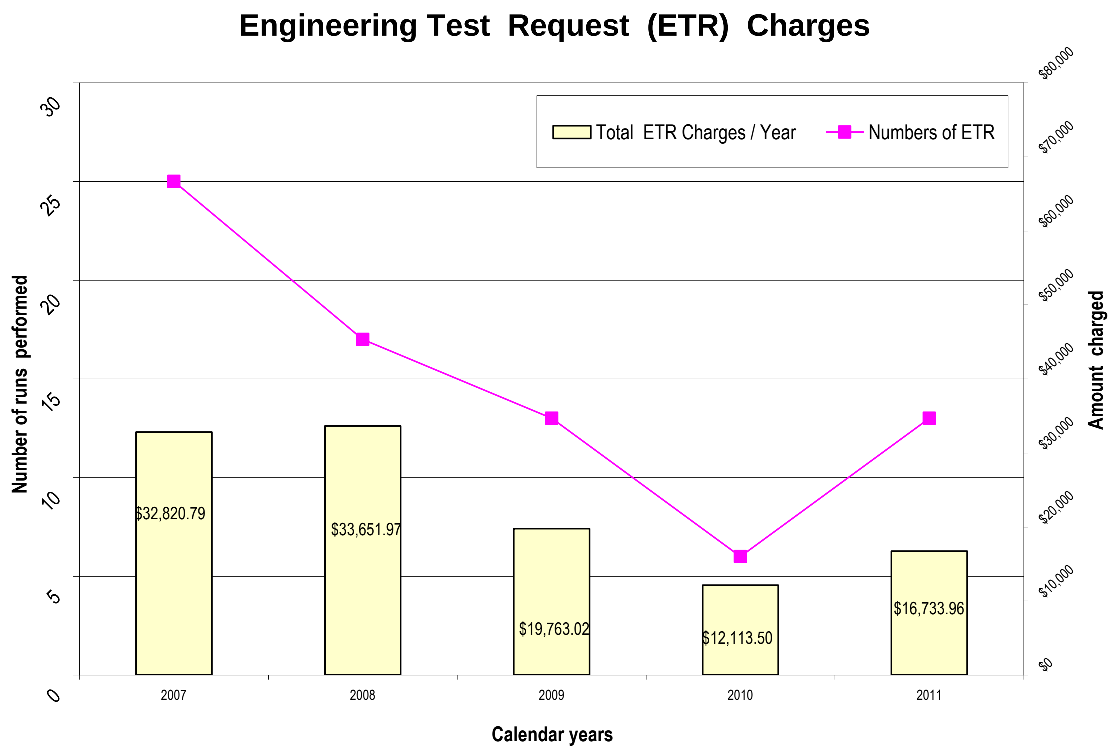


Figure 3 Engineering Test Requests (ETRs) for the past 5 years

MEMS-EXCHANGE PROCESS SERVICE

We continued our services/support of the MEMS-Exchange and were able to complete seven runs (9 steps total) for this period of the annual report.

Mask Making Services

Mask making was down for a while due to the move, however overall number of the masks fabricate in-house were compatible with the previous years at ~1300 for this period of 1 ½ year. This operation is also capable of supporting our new ASML stepper.

Special Requests/ other Services

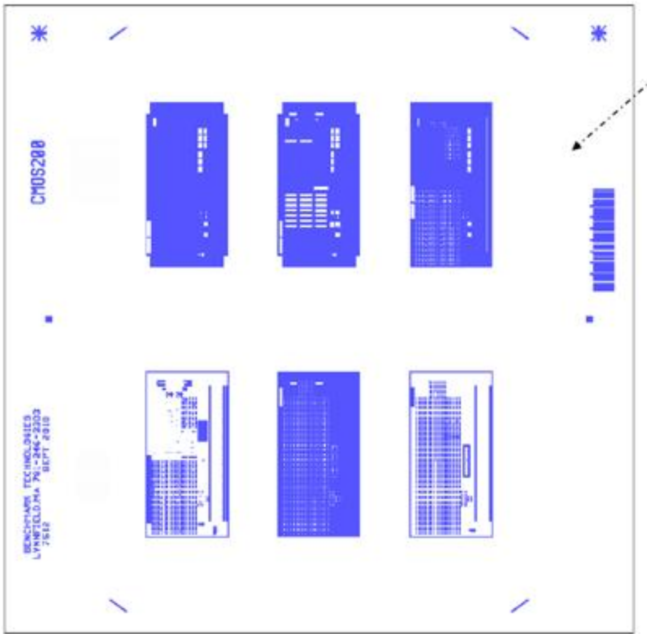
Staff supplied the NanoLab office with pocket wafers, poly-Si control wafers for general use and two sets of 25 pocket wafers that were made in October of 2010 and June of 2011. Pocket wafers warrant collective effort of the process staff usually takes about 2 weeks to complete. We also made show wafers for retired staff.

VII. BASELINE ACTIVITIES

CMOS200 Baseline Run

A new Mask set was designed/fabricated for the new ASML5500/300 by Laszlo Petho. our previous baseline engineer way ahead of stepper arrival. This was a new version of previous test chips where CDs were pushed to test the new stepper limit. A new baseline run (CMOS200 with chip dimensions of 5.030 mm x 10.060 mm is currently in progress at N- S/D implantation step.

The smaller new version of the baseline test chip allowed for a 6 litho layers (previously 4) mask for our critical layers, a good saving when small geometries are involved and masks need to get sent out for fabrication, Figure 4 below.



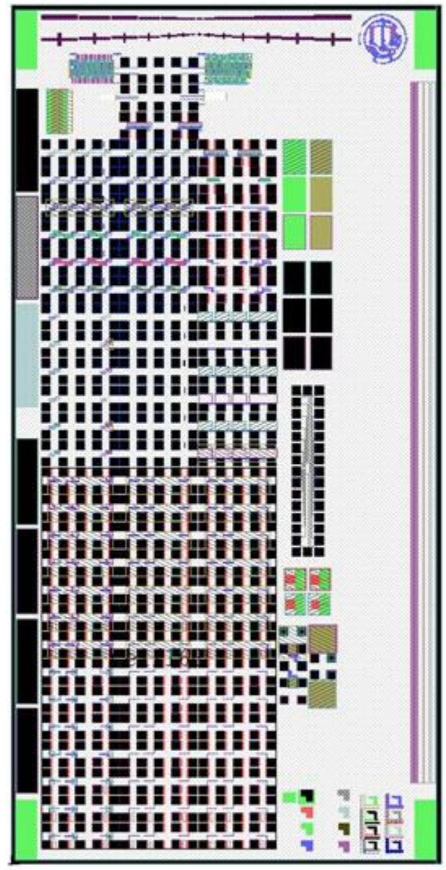


Figure 4 CMOS200 Chip Layout
Left – A 6 layers ASML /300 chrome mask
Right – CAD layout of all layers together

VIII. REPORTS, PUBLICATION, AND SEMINARS

- Process staff attended BSAC IAB seminars (1/2 day).
- Process staff attended the Semicon West exhibition in July 2010.
- Process staff attended the Solid State Technology and Devices Seminars on Fridays.