



The Berkeley Micro/NanoLab High School Intern Program For Young Women

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**Marvell Nanofabrication Laboratory
University of California, Berkeley**

2016 UGIM SYMPOSIUM
SALT LAKE CITY, UTAH-JUNE 12-15, 2016

IEST



UTAH NANOFAB

Outline



- **Who**

- **What**

- **What**

- **Why**

- **When**

- **When**

- **Where**

- **Where**

- **Why**

- **Who**

- **How**

- **How**

What ?



➤ **Student Intern Program**

- **Started in 2001**
- **Led by Faculty Director Discretionary Funds**
- **Continued by Lab Manager with Affiliate Fees**
- **Primarily high school young women**
 - **Completed junior year (>16years old)**
 - **Completed chemistry (chemistry and physics preferred)**

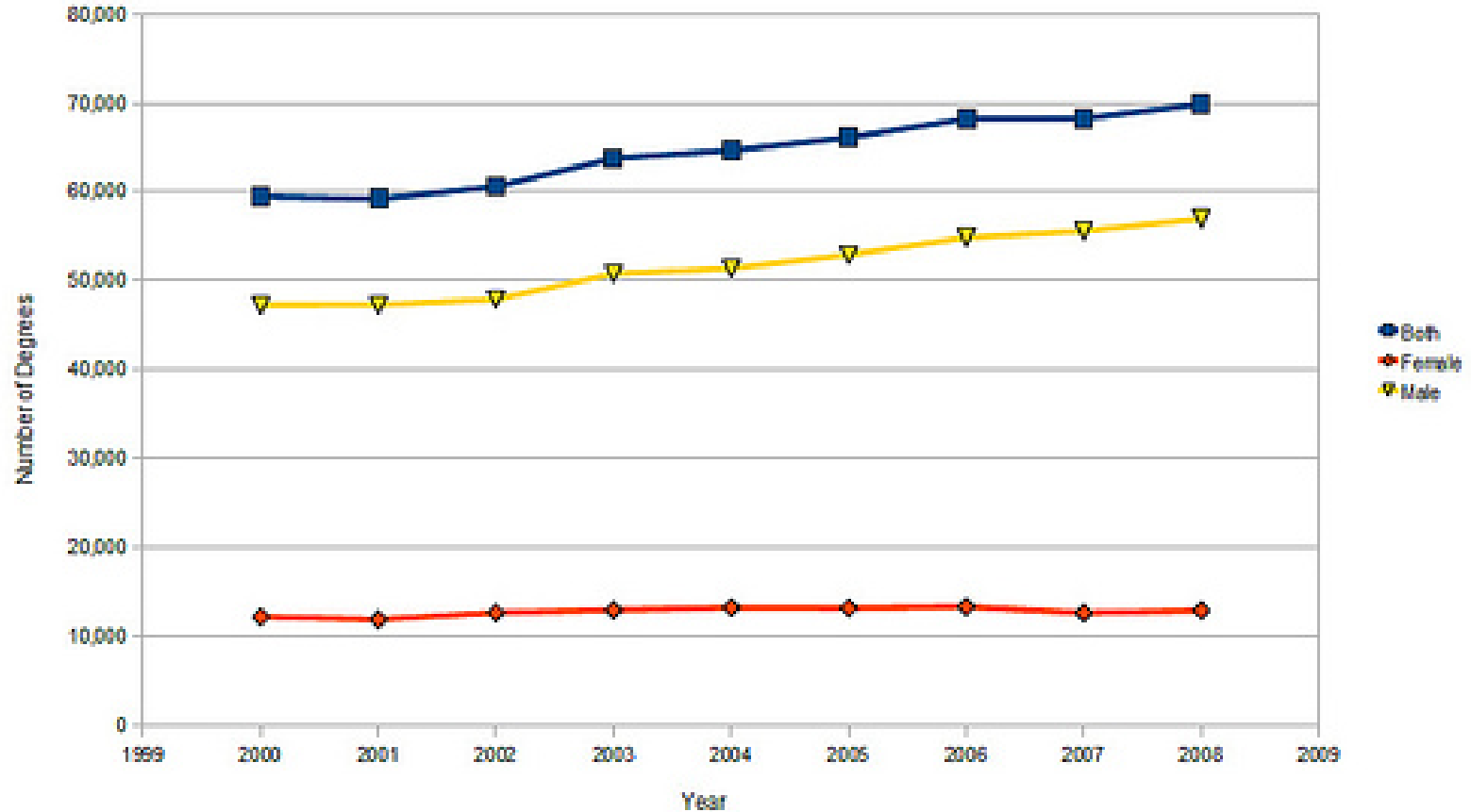
Why ?



- **Lack of Female Representation in E&S**
- **Broader Impact Criteria of Funding Agencies**
- **Well Defined Projects Provide Lab Benefit**
- **Stimulant to Laboratory Staff and Skills**
- **Part of the Educational Mission**

Number of Bachelor's Degrees awarded in Engineering Fields, by Gender (2000-2008)

(source: National Science Foundation)



Source:

<http://www.nsf.gov/statistics/2015/nsf15311/tables.cfm#degrees>

Web site now contains data through 2012

When ?



➤ Summer !

- **8 weeks total program, 1 week flexible**
- **4 days per week (Monday or Friday off)**
- **Full time 8hours/day, parallel mentor's schedule**
- **Start on Monthly Orientation day**
- **1 week start up, 1week final prep = 5-6 weeks work**
- **160 - 190 - 224 hours ~ 0.1 FTE**

Where ?



➤ Your Laboratory

- Shared desk space, personal cell phones and laptop
- If no laptop, lab terminals often suffice
- Introduce to campus resources
 - Campus tour, bookstore, student groups SWE, WICSEE
 - Weekly lunch Video Series – Silicon Run
 - Local conference or trade show (Semicon)
 - Unique aspects of your campus – museum, other labs...

Who ?



➤ **“Recruit” from Local High Schools**

- **Simple web page posting**
 - **grew from 2 to > 50 applicants in < 5years**
 - **most engaged/qualified applicants find us**
 - **all exceptionally qualified, difficult to justify selection**
 - **Too many turned away**
- **This year partnered with local AP Chemistry teacher**
 - **He selects qualified; we meet and verify**

➤ **In house staff and faculty requests – your call**

- **good luck turning down the dean’s daughter**

How ?



- **Hire them as Laboratory Assistants**
 - This likely addresses all insurance and liability issues; they are employees of the university
 - Paid internships support students that need funds
 - 224 hours \$10-\$14/hour \$2500-\$3000/intern
 - Estimate 5 hours admin/intern
 - Consider sponsorship by local vendor!
 - Gifts to Lab are likely to be fully discretionary funds
- **Assign one on one mentor is considered key**


Summary



- **30 interns in 15 years. Max 5/year, Min 0, Avg 2**
- **3 not in college yet, 6 tracking info**
- **21 BS degrees**
 - 4 Berkeley, 4 Stanford, MIT, Olin, UCLA, UCI, USC, CMU, Dartmouth, Swarthmore...
- **3MS, 2 MBA, 1 MA Edu**



Sample Projects

A decorative graphic on the left side of the slide, consisting of a network of light blue lines and circles on a dark blue background, resembling a printed circuit board or a neural network diagram.

INVESTIGATION OF A SPIN-ON DIELECTRIC AS AN INTERLAYER DIELECTRIC FOR THE MARVELL NANOFABRICATION LABORATORY CMOS210 BASELINE PROJECT

KEVIN CRABBE

JULY, 31ST 2014

2014 TRANSFER TO EXCELLENCE RESEARCH PROGRAM

UC Berkeley NanoLab Summer Internship 2013

Front and back-end development of a new
website for one of the recharge centers

Nova Ng

Saratoga High School

July 25, 2013





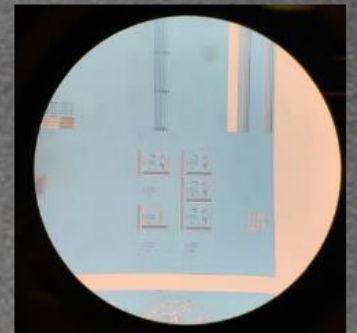
**i-Line Photoresist
Development at the Marvell
Nanofabrication Laboratory:
*Validation of New Standard i-Line
Photoresist OiR 906-12***

**Nishtha Bhatia
Washington High School
July 31st, 2014**



Critical Dimension Enhancement of DUV Photolithography on the ASML 5500/300

Francesca Calderon
Miramonte High School
August 13th, 2015



A High School Intern's Description of the NanoLab

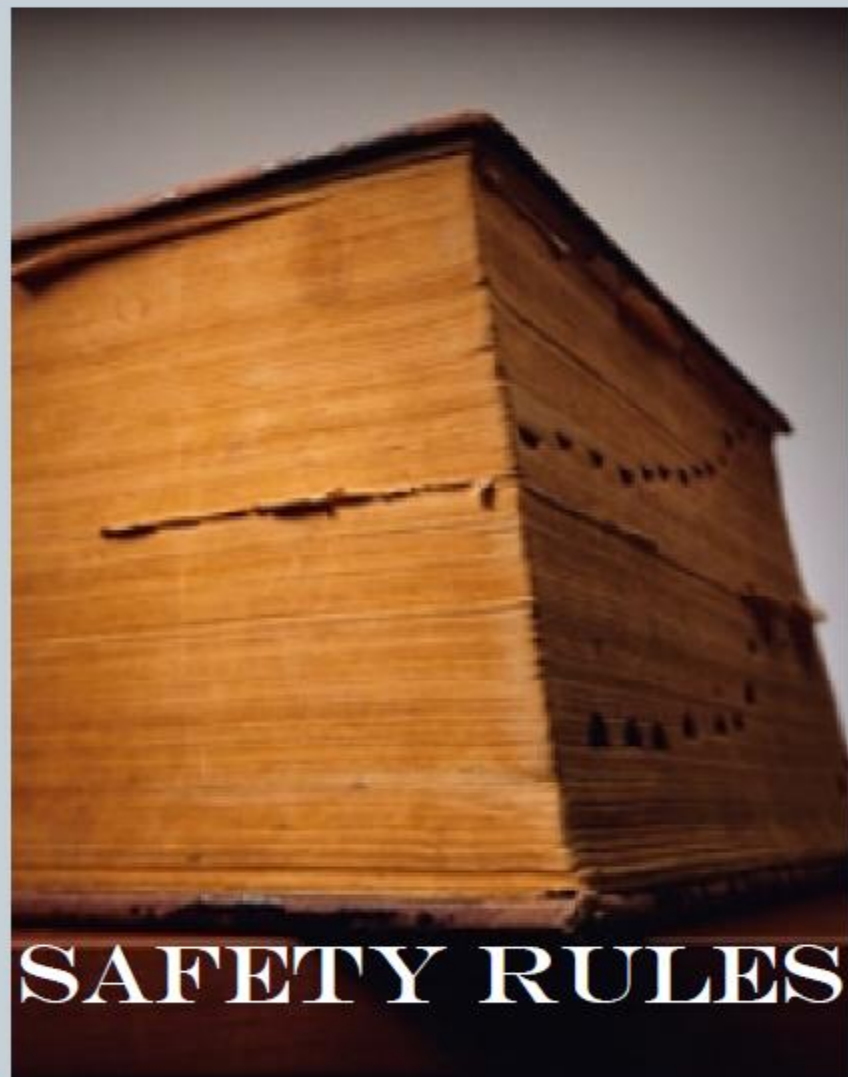
Day



The Essentials



BUNNY SUIT



SAFETY RULES



Publicity and Photos...

#ILookLikeAnEngineer challenges sexism and showcases real women in tech



You May Have Seen My Face on BART

Hi, my name is Isis Anchalee

"Do you feel passionately about helping spread awareness about tech gender diversity? Do you not fit the 'cookie-cutter mold' of what people believe engineers 'should look like?' If you answered yes to any of these questions I invite you to help spread the word and help us redefine "what an engineer should look like." #iLookLikeAnEngineer.



My name is Anjali. I
used plasma to etch
Silicon wafers at the VC
Berkeley nanolab.

#ILookLikeAnEngineer



My name is Anushka
And I monitored plasma
etches using optical
emission spectroscopy.
#ILookLikeAnEngineer



My name is Francesca
and I resolved 150 nm
lines on the
ASML 5500/300

I LOOK LIKE AN ENGINEER



My name is Rachel
and I developed a data
processing program for
UC Berkeley NanoLab
#iLookLikeAnEngineer

The 2015 NanoLab Interns



Twitter Post from Semicon West



CITRIS
@citrисnews

 Follow

A warm welcome to the Berkeley Marvell NanoLab high school interns! First stop was @SEMICONWest #nano @UCBerkeley



RETWEET
1

LIKE
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10:29 PM - 30 Jul 2015

Thank You

The Berkeley Micro/NanoLab High School Intern Program for Young Women

A. William Flounders, Katalin Voros, Tsu-Jae King Liu

Sponsorship: University of California, Berkeley Marvell Nanofabrication Laboratory

The Berkeley Microlab initiated a High School Intern Program in summer 2001. This informal program has sponsored 30 students to date in a 7 week intensive summer research apprenticeship. Initial support was from Faculty Director discretionary funds. The program is presently funded by membership fees from the Berkeley NanoLab's commercial user affiliate program.

This talk will describe the essential elements of the program, the typical schedule, and present some sample research topics. The presentation will emphasize that similar programs can be readily established at other university laboratories with modest effort and minimal cost. The fundamental element required is a defined staff person assigned to each student with a willingness to mentor.