SMFL Users News Letter – Number 140815 V9.1

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.

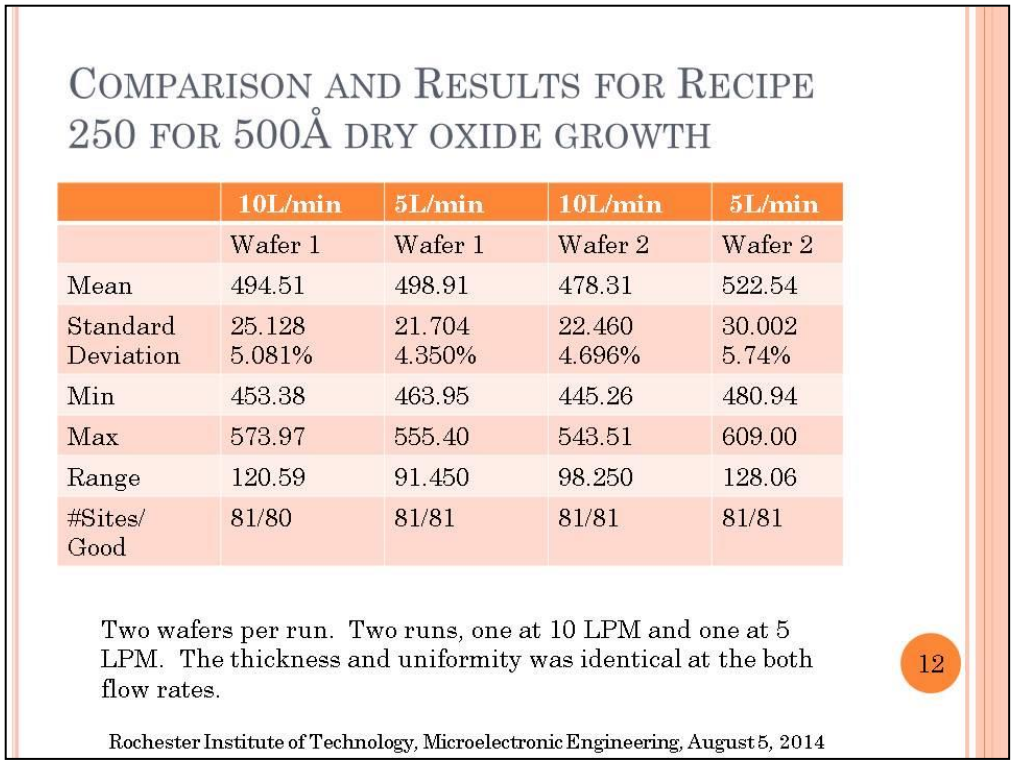
Reducing Oxygen Flow Rate in the Bruce Furnace:

This document contains information on reducing oxygen flow rate from 10 LPM to 5 LPM during the soak for dry oxide growth on Bruce Tube 1 and 4. During the soak the furnace door is closed with only tiny openings to room air around the paddle support. Gas flow prevents room air from entering the furnace tube and provides the oxygen needed to form silicon dioxide. 10 LPM is a very large flow. For example consider all our wet oxide growth recipes where the gas flow during the soak is 3.6 LPM for Oxygen plus 2.0 LPM for hydrogen for a total of 5.6 LPM. Calculations show that 5 LPM of Oxygen provides 19,000 times the oxygen needed for the formation of silicon dioxide on both sides of 50 wafers. We ran a few experiments to show that the thickness and uniformity remains the same after reducing the oxygen flow from 10 LPM to 5 LPM.

RIT uses approximately 60 bottles of oxygen per year at $225 each for a total of $13,500. Reducing our oxygen flow rates to 5 LPM during the soak for dry oxide could save ~$2000 per year.

Visualize gas flow at 100 sccm, 200sccm and 10 LPM (Video) http://people.rit.edu/lffeee/Gas_Flow.wmv

Our full report is given on my webpage: http://people.rit.edu/lffeee/ReducingOxygenUsage.pdf



COMPARISON AND RESULTS FOR RECIPE 250 FOR 500Å DRY OXIDE GROWTH

	10L/min	5L/min	10L/min	5L/min
	Wafer 1	Wafer 1	Wafer 2	Wafer 2
Mean	494.51	498.91	478.31	522.54
Standard Deviation	25.128 5.081%	21.704 4.350%	22.460 4.696%	30.002 5.74%
Min	453.38	463.95	445.26	480.94
Max	573.97	555.40	543.51	609.00
Range	120.59	91.450	98.250	128.06
#Sites/ Good	81/80	81/81	81/81	81/81

Two wafers per run. Two runs, one at 10 LPM and one at 5 LPM. The thickness and uniformity was identical at the both flow rates.

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Rochester Institute of Technology, Microelectronic Engineering, August 5, 2014