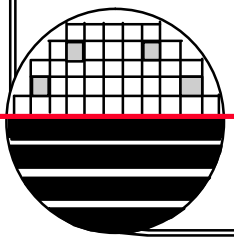
ROCHESTER INSTITUTE OF TECHNOLOGY
MICROELECTRONIC ENGINEERING

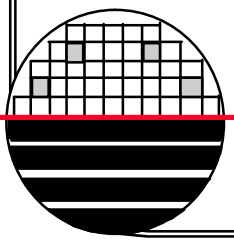
LAM 490 Etch Recipes

Dr. Lynn Fuller
Professor, Microelectronic Engineering
Webpage: http://people.rit.edu/lffeee
Rochester Institute of Technology
82 Lomb Memorial Drive
Rochester, NY 14623-5604
Tel (585) 475-2035
Fax (585) 475-5041
Email: Lynn.Fuller@rit.edu
MicroE Webpage: http://www.microe.rit.edu



OUTLINE

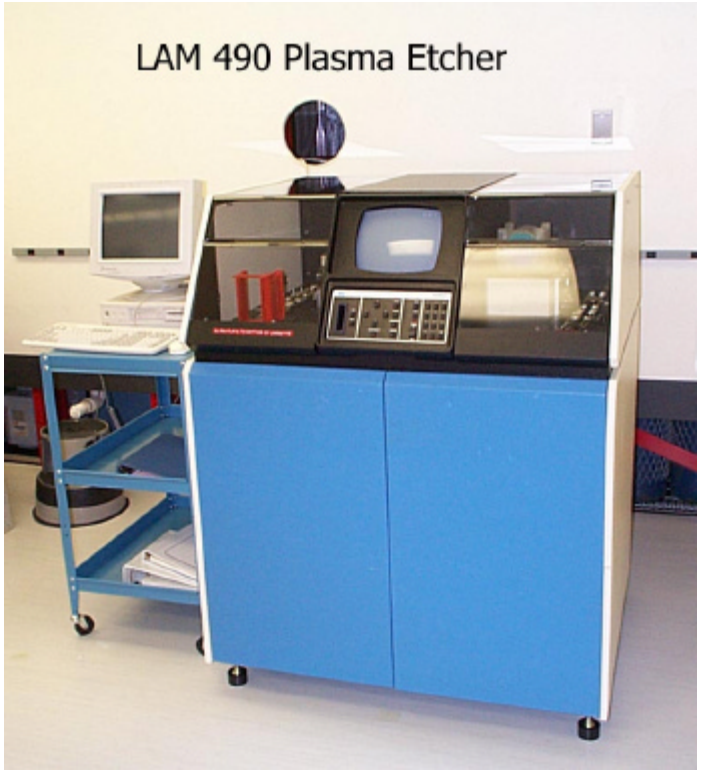
1500Å Nitride Recipe with End Point Detection
End Point Signals
3500Å Nitride Recipe with End Point Detection
End Point Signals
6000 Å Poly Recipe with End Point Detection
End Point Signals
Shallow Trench (STI) Etch Recipe with End Point Detection
End Point Signals
Photoresist Stripping/Carbon Films/Paralyene/Chamber Clean



LAM 490 PLASMA ETCH FOR 1500Å NITRIDE

- Follow LAM490 SMFL operations manual for start up
- Send FNIT1500.RCP
- Press ‘Recipe’ button on LAM to verify the Recipe
- Press ‘Parameters’ button and **modify** Endpoint 1 to match
- Proceed with Etch

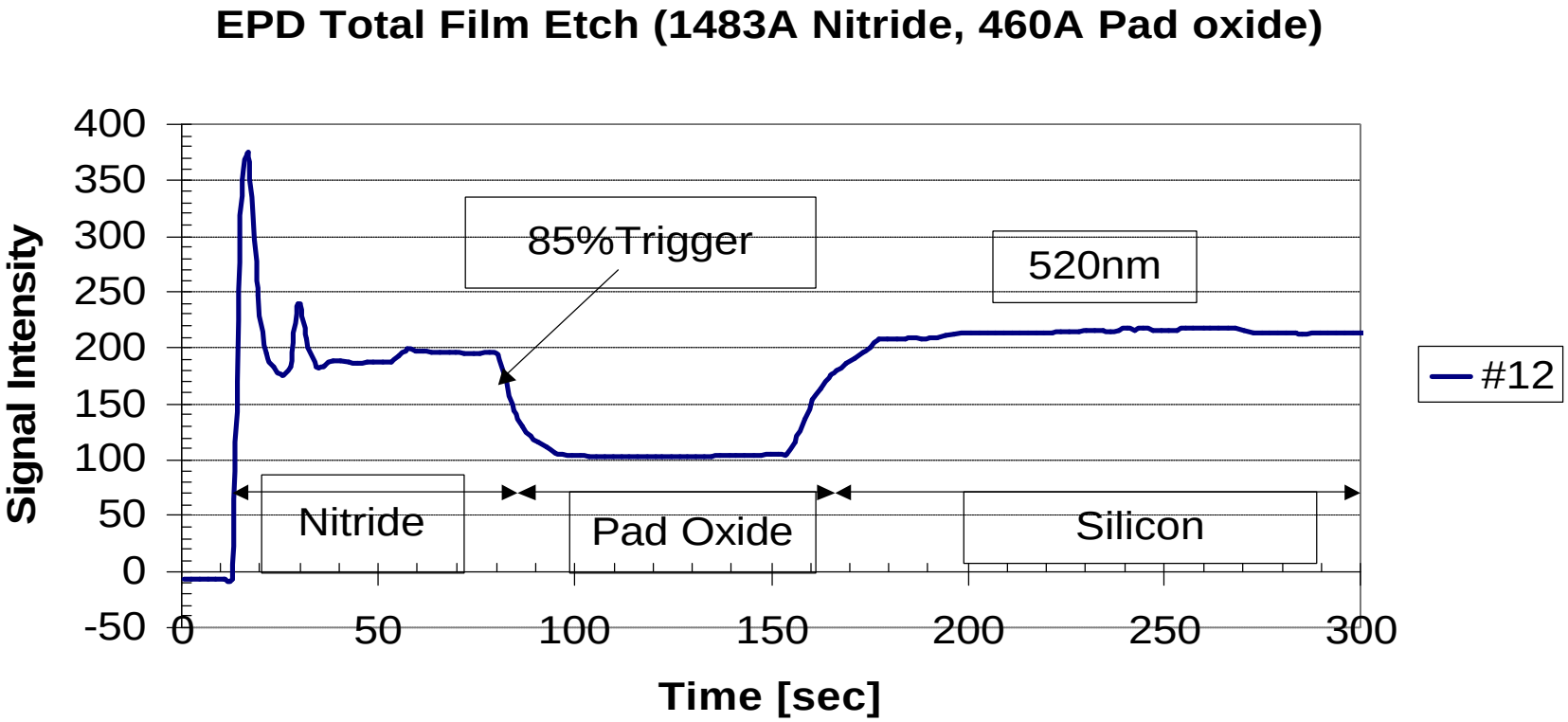
Parameters
Endpoint 1
Press field select to change to endpoint setup screen and edit the following
Sampling A only [520nm ch 12]
Active during step 02
Delay 50 sec before normalizing
Normalize for 10 sec
Trigger @ 85% of normalized value



	Step 1	Step 2	Step3
Pressure	260 mT	260 mT	260 mT
RF Top	0	125	125
Gap	1.65	1.65	1.65
CF4	0	0	0
Oxygen	0	0	0
Helium	0	0	0
SF6	200	200	200
Compl	Time Only	Time & Endpoint	Overetch
Max	1 min	2 min 30s	40%

Robert Saxer, Dan Brown, Dr. Fuller

NITRIDE END POINT PARAMETERS



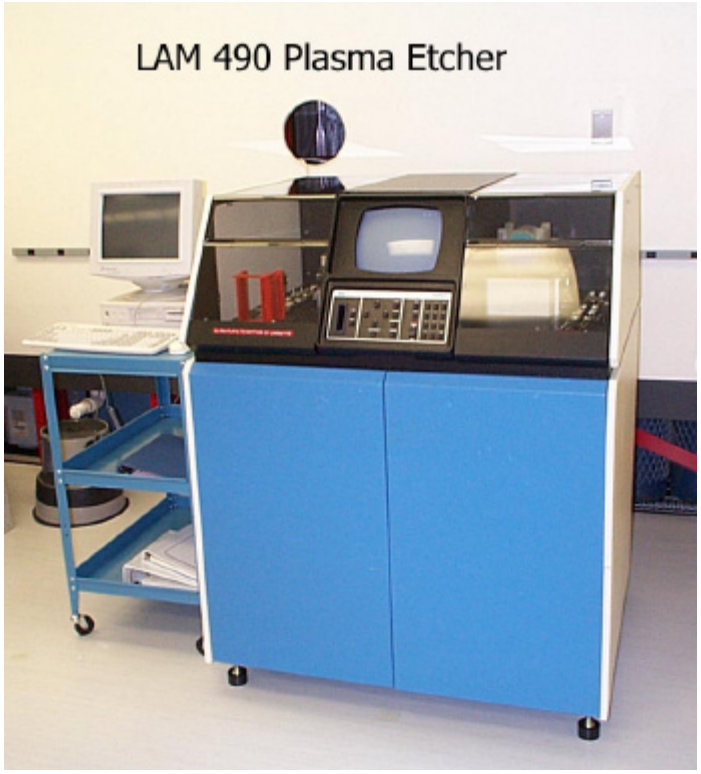
If no Endpoint is found then
Max Etch Time 2 min 20 sec
If Endpoint is found then
Overetch ~40%

Sampling A only [520nm ch 12]
Active during step 02
Delay 50 sec before normalizing
Normalize for 10 sec
Trigger @ 85% of normalized value

LAM 490 PLASMA ETCH FOR 3500Å NITRIDE

- Follow LAM490 SMFL operations manual for start up
- Send FNIT3500.RCP
- Press ‘Recipe’ button on LAM to verify the Recipe
- Press ‘Parameters’ button and **modify** Endpoint 1 to match
- Proceed with Etch

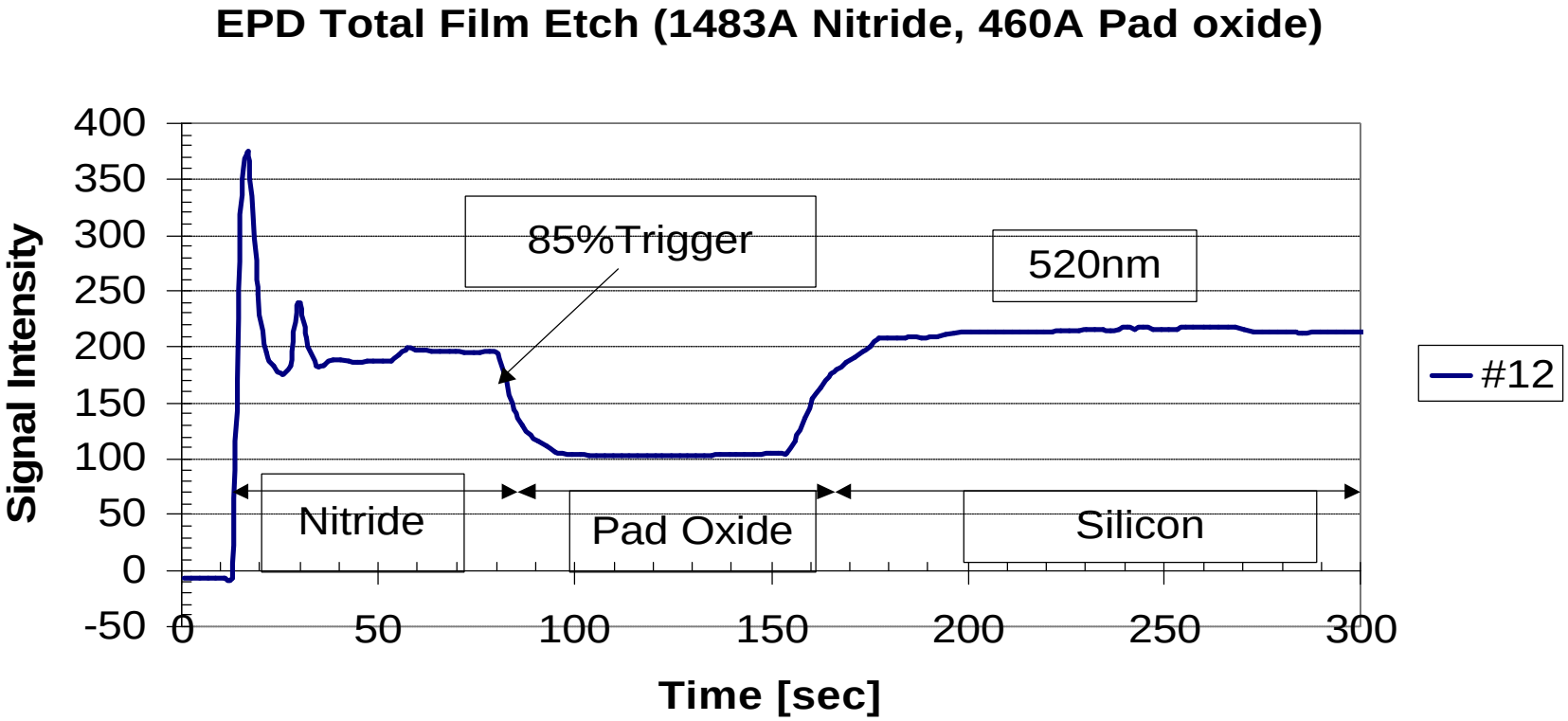
Parameters
Endpoint 1
Press field select to change to endpoint setup screen and edit the following
Sampling A only [520 nm ch 12]
Active during step 02
Delay 90 sec before normalizing
Normalize for 10 sec
Trigger @ 85% of normalized value



	Step 1	Step 2	Step3
Pressure	260 mT	260 mT	260 mT
RF Top	0	125	125
Gap	1.65	1.65	1.65
CF4	0	0	0
Oxygen	0	0	0
Helium	0	0	0
SF6	200	200	200
Compl	Time Only	Time & Endpoint	Overetch
Max	1 min	5min 45s	30%

Robert Saxer, Dan Brown, Dr. Fuller

NITRIDE END POINT PARAMETERS



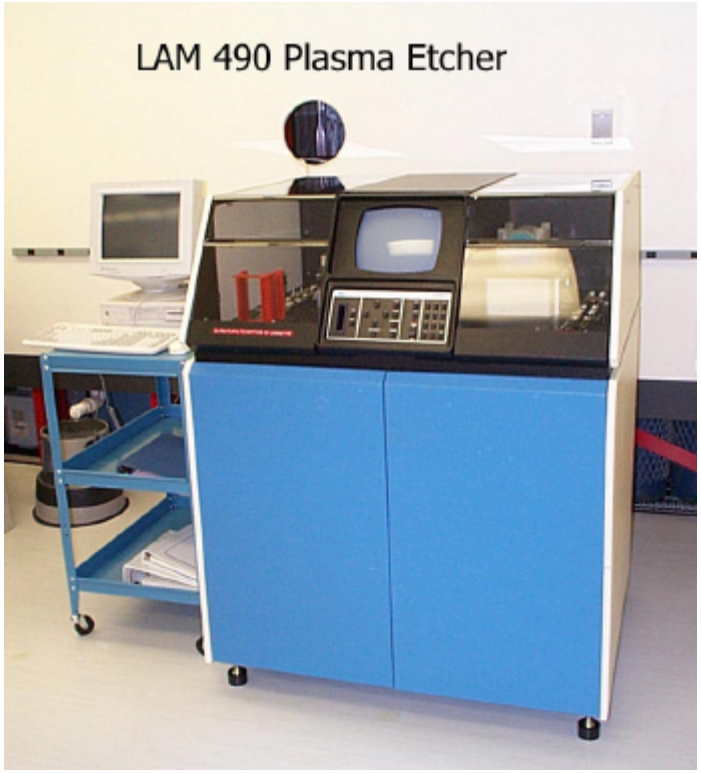
If no Endpoint is found then
Max Etch Time 5 min 45 sec
If Endpoint is found then
Overetch ~30%

Sampling A only [520nm ch 12]
Active during step 02
Delay 90 sec before normalizing
Normalize for 10 sec
Trigger @ 85% of normalized value

LAM 490 PLASMA ETCH FOR STI (1500 Å NITRIDE ON 500 Å OXIDE ON SILICON)

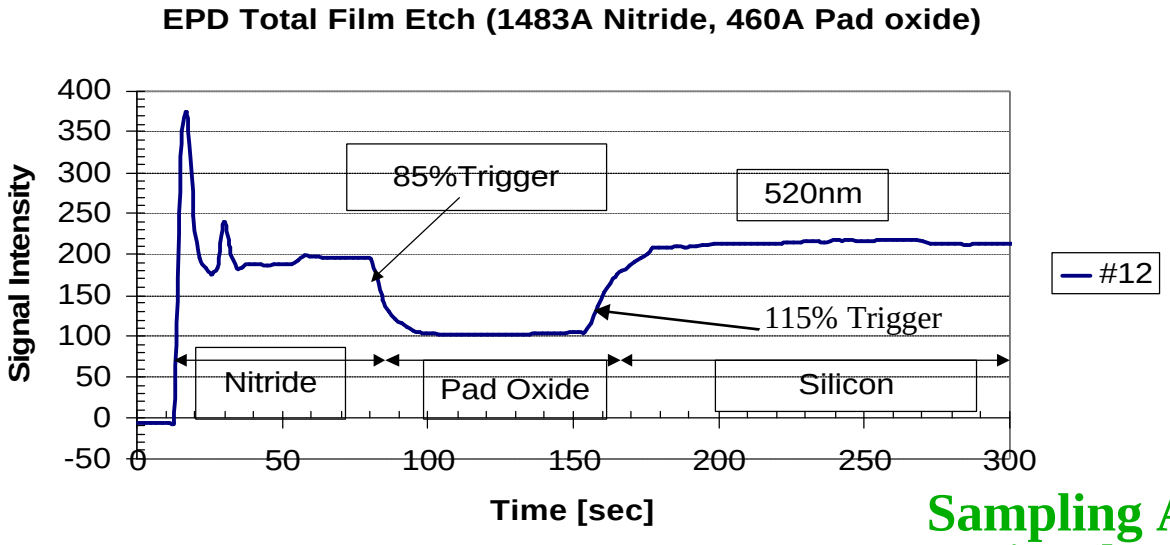
- Follow LAM490 SMFL operations manual for start up
- Send FACSTI.RCP
- Press 'Recipe' button on LAM to verify the Recipe
- Press 'Parameters' button and **modify** Endpoint 1&2 to match
- Proceed with Etch

Endpoint 1
Press field select to change to endpoint setup screen and edit the following
Sampling B only [405 nm ch 13]
Active during step 02
Delay 60 sec before normalizing
Normalize for 15 sec
Trigger @ 75% of normalized value
Endpoint 2
Sampling B only [405 nm ch 13]
Active during step 03
Delay 60 sec before normalizing
Normalize for 15 sec
Trigger @ 115% of normalized value



	Step 1	Step 2	Step 3	Step 4
Pressure	260 mT	260 mT	260 mT	260 mT
RF Top	0	125 w	125 w	125 w
Gap	1.65	1.65	1.65	1.65
CF4	0	0	0	0
Oxygen	0	0	0	0
Helium	0	0	0	0
SF6	200 sccm	200 sccm	200 sccm	200 sccm
Compl	Time Only	Time & Endpoint	Time & Endpoint	Time
Tmax	2:00 min	3:30 min	4:00 min	30 sec

STI END POINT PARAMETERS



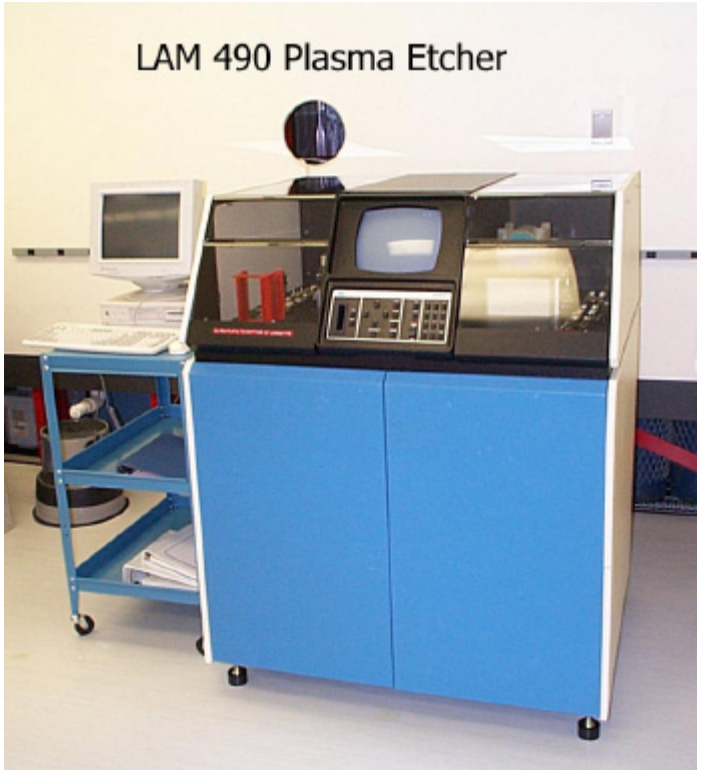
Sampling A only [520nm ch 12]
Active during Step 2
Delay 50 sec before normalizing
Normalize for 10 sec
Trigger @ 85% of normalized value

Sampling A only [520nm ch 12]
Active during Step 3
Delay 30 sec before normalizing
Normalize for 10 sec
Trigger @ 115% of normalized value

LAM 490 PLASMA ETCH FOR 6000Å POLY

- Follow LAM490 SMFL operations manual for start up
- Send FACPOLY.RCP
- Press ‘Recipe’ button on LAM to verify the Recipe
- Press ‘Parameters’ button and **modify** Endpoint 1 to match
- Proceed with Etch

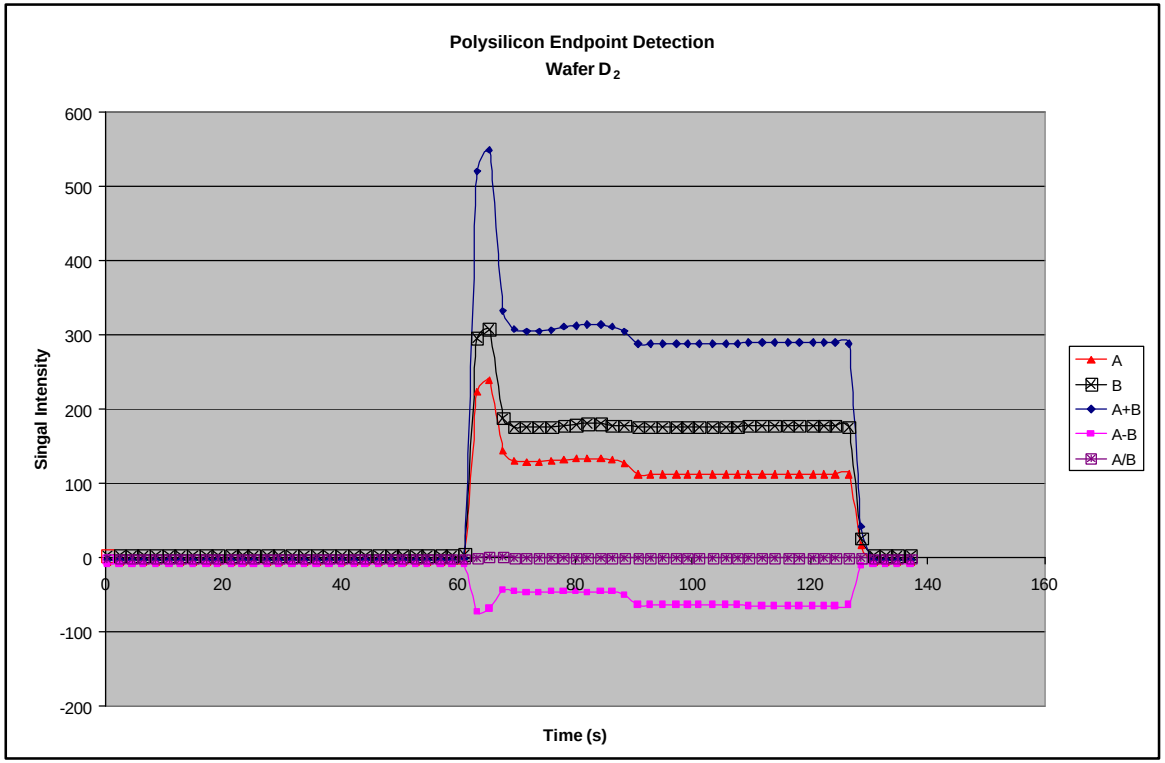
Parameters
Endpoint 1
Press field select to change to endpoint setup screen and edit the following
Sampling A only [520 nm ch 12]
Active during step 02
Delay 15 sec before normalizing
Normalize for 10 sec
Trigger @ 90% of normalized value



	Step 1	Step 2	Step3
Pressure	325 mT	325 mT	325 mT
RF Top	0	140	140
Gap	1.65	1.65	1.65
CF4	0	0	0
Oxygen	15	15	15
Helium	0	0	0
SF6	140	140	140
Compl	Time Only	Time & Endpoint	Overetch
Max	2 min	1 min 15s	10%

Robert Saxer, Dan Brown, Dr. Fuller

POLYSILICON END POINT PARAMETERS



Sampling A only [520nm ch 12]
Active during Step 3
Delay 15 sec before normalizing
Normalize for 10 sec
Trigger @ 90% of normalized value

LAM 490 ETCHING OF PARYLENE, CARBON FILM (DIAMOND LIKE FILM) AND PHOTORESIST STRIPPING

Etch Rate (for Resist) = 3500 Å/min
Etch Rate (for Parylene) = 3000 Å/min
Etch Rate (for Carbon) = 2500 Å/min

Step 01
Pressure = 225 mTorr
Power = 0 watts
Gap = 1.5 cm
O2 Flow = 100 sccm
He Flow = 50 sccm
Time = 60 sec

Step 02
Pressure = 225 mTorr
Power = 225 watts
Gap = 1.5 cm
O2 Flow = 100 sccm
He Flow = 50 sccm
Time = thickness/rate

Chamber clean is same etch recipe with step 02 time of 10-20 min. using bare 150 mm silicon wafer