

## 1. Introduction

The purpose of this document is to examine the etch properties of the Oxford 80 Plus RIE system.

## 2. Baseline Recipe

Units:

Gas flow rate: standard cubic centimeters per minute (sccm)

Pressure: millitorr (mT)

- Temperature: degrees Celsius (C)
- High frequency (RF) power: Watts (W)

Step 1: Pump to 5e-04 Torr, "Pump to Pressure" checked

Step 2: Etch Step

Trifluoromethane (CHF<sub>3</sub>) flow rate: 100 sccm

Oxygen (O<sub>2</sub>) flow rate: 4 sccm

Pressure: 50 mT

RF Power: 150 W

Capacitor starting points: Capacitor #1: 60 %, Capacitor #2: 80 %

Time set point is hh:mm:ss (hours:minutes:seconds)\*

Temperature: 15 C

Step 3: Pump to 5e-04 Torr, "Pump to Pressure" checked

\*notes for Step 2: The time set point for the etch step should be kept below 10 minutes due to thermal issues and to avoid resist burning. If a longer time is needed for a thicker film then the system should be vented prior to running the process again.

## 3. Etch Characteristics

Film thickness is measured using a Filmetrics F50 optical interferometer which is equipped with a motorized stage allowing for the collection of full wafer maps. See the following link for more information about this instrument: <a href="http://www.filmetrics.com/thicknessmeasurement/f50">http://www.filmetrics.com/thicknessmeasurement/f50</a>



The film being etched is PECVD SiO<sub>2</sub> deposited on 100 mm, <100> orientation, wafers that are  $525 \pm 25$  micron thick.

Figure 1 below shows a screen capture image of a "Difference Map" from the Filmetrics software with 115 data points and a 5 mm edge exclusion. The standard SiO<sub>2</sub> material file supplied in the software is used for these measurements. This is data from a 3 minute etch displayed as a "difference map" in the software that is already averaged to display the etch rate in nm/min.

	WaferMap	Measure	History	
42.50 nm/m 42.17 nm/m 41.83 nm/m 41.50 nm/m 40.83 nm/m 40.50 nm/m 40.50 nm/m 39.83 nm/m 39.50 nm/m 39.17 nm/m	41.01 41.00 41.00 41.00 41.00 41.00 41.00 41.05 41.05 41.45 41.94 40.80 41.45 41.95 41	41.07 40.05 40.79 45 41.36 41.46 41.43 43 41.78 41.74 41.93 41.78 41.74 41.95 41.98 41.85 41.7 41.95 41.99 41.92 42.07 41.90 41.92 42.07 41.90 41.97 4 79 42.03 41.97 42.09 41.97 41.91 41.88 41.93 18 42.05 41.96 41.93 42.00 41.90 41.86 4 42.00 41.90 41.86 41.88 42.13 41.91 41.6 67 41.59 41.75 41.60 4 53 41.29 41.35 41.38 41.10 40.62 40.57 sample Diameter: 100 mm	147 Map informatic   147 D   3 41.53   41.84 41.65   1.96 41.88   41.98 41.63   41.98 41.63   1.92 41.83   41.75 41.53   41.75 41.53   41.49 41.49   1.45 Cold   Map informatic Cold   Map informatic Map informatic   1.92 41.83 41.52   41.76 41.53 Map informatic   1.45 Cold Map informatin	Image: Constraint of the second sec

Figure 1. Wafer map showing the results for a 3 minute  $SiO_2$  etch using CHF<sub>3</sub> and O<sub>2</sub> showing 42 nm/min etch rate with a standard deviation of 0.43 nm and a uniformity across the wafer of <u>+</u> 3.3%.