1. Dry Etching of SiO2, SiNx, and Si using 80plus Reactive Ion Etcher

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Keywords
Etch rate, Dry Etching, SiO2, SiNx, Si, 80plus

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1. Dry Etching of SiO\textsubscript{2}, SiN\textsubscript{x}, and Si using 80plus Reactive Ion Etcher (Graduate Student Fellow Program)

Prepare by Prashanth Gopalan (4/3/2014)

**SiO\textsubscript{2} etch**
- Ar = 38 sccm
- CHF\textsubscript{3} = 12 sccm
- Pressure = 30 mTorr
- Power = 200 W
- T = 17.5 °C
- Etching rate: 33 nm/min

*Note:* Etch rate also depends on the sample size and percentage of the open area, which is not covered by resist film.

**Time and power dependence of etch depth** (12/6/2013)
Power dependence of etch rate (1/9/2014)
Power dependence of etch rate

Etch Rate (nm/min) vs. Power (W)

- Zero Power: Etch Rate = 0 mm/min
- Power increases linearly with etch rate
**SiN<sub>x</sub> etch**

- O<sub>2</sub> = 5 sccm
- CHF<sub>3</sub> = 50 sccm
- Pressure = 20 mTorr
- Power = 150 W
- T = 17.5 °C
- Etching rate: 61 nm/min

**Note:** Etch rate also depends on the sample size and percentage of the open area, which is not covered by resist film.

**Time and power dependence of etch depth (1/9/2014)**

![Graph showing time and power dependence of etch depth](image)
Power dependence of etch rate (1/9/2014)

![Power dependence of etch rate graph](image-url)
**Shallow Si etch**

- Pressure: 10 mTorr
- CHF3: 35 sccm
- SF6: 14 sccm
- RF power: 100 W
- T = 17.5 °C.
- Default etching rate: 35 nm/min

**Note:** Etch rate also depends on the sample size and percentage of the open area, which is not covered by resist film.

- 4/3/2014
- The sample size: ~10 x 10 mm²
- Percentage of the open area: ~80%
- Etch rate: 140 nm/min
Deep Si etch

- SF6 = 50 sccm
- O2 = 10 sccm
- Pressure = 150 mTorr
- RF power = 100 W
- T = 20 °C
- Etch rate 500-700 nm/min (in the brochure)
- Selectivity to SiO2 mask: >50:1

Note: Etch rate also depends on the sample size and percentage of the open area, which is not covered by resist film.

- 3/24/2014:
  - 440 nm thick SiO2 mask
  - 20 min etch, etch rate = 482 ± 14 nm/min
    - Note: The verticality will be investigated.

- 30 min etch, etch rate = 528 ± 14 nm/min
  - Note: The verticality will be investigated.