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

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

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

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1. Dry Etching of SiO_2, SiN_x, and Si using 80plus Reactive Ion Etcher (Graduate Student Fellow Program)

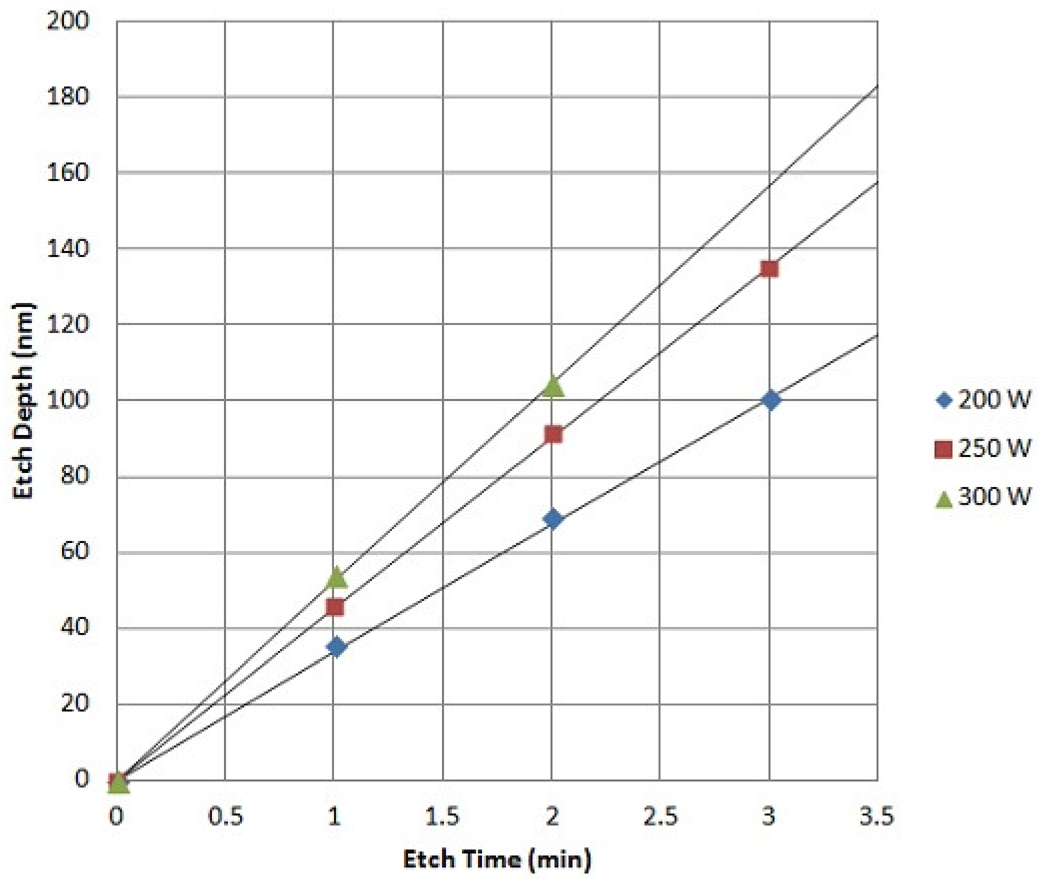
Prepare by Prashanth Gopalan (4/3/2014)

SiO2 etch

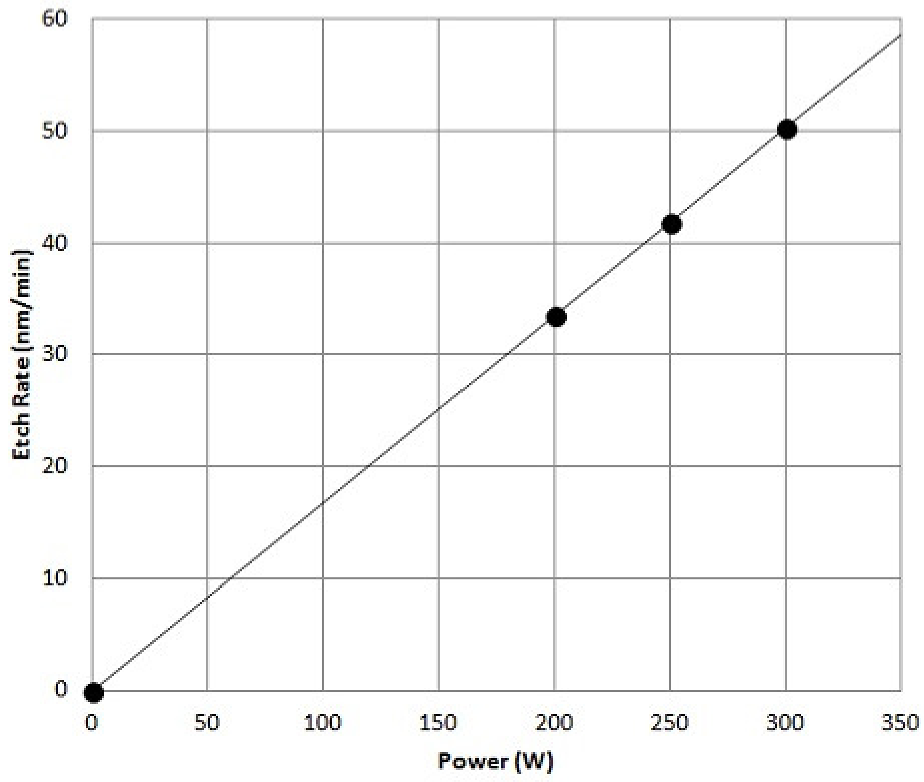
- Ar = 38 sccm
- CHF3 = 12 sccm
- Pressure = 30 mTorr
- Power = 200 W
- T = 17.5 °C
- Etching rate: 33 nm/min

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)

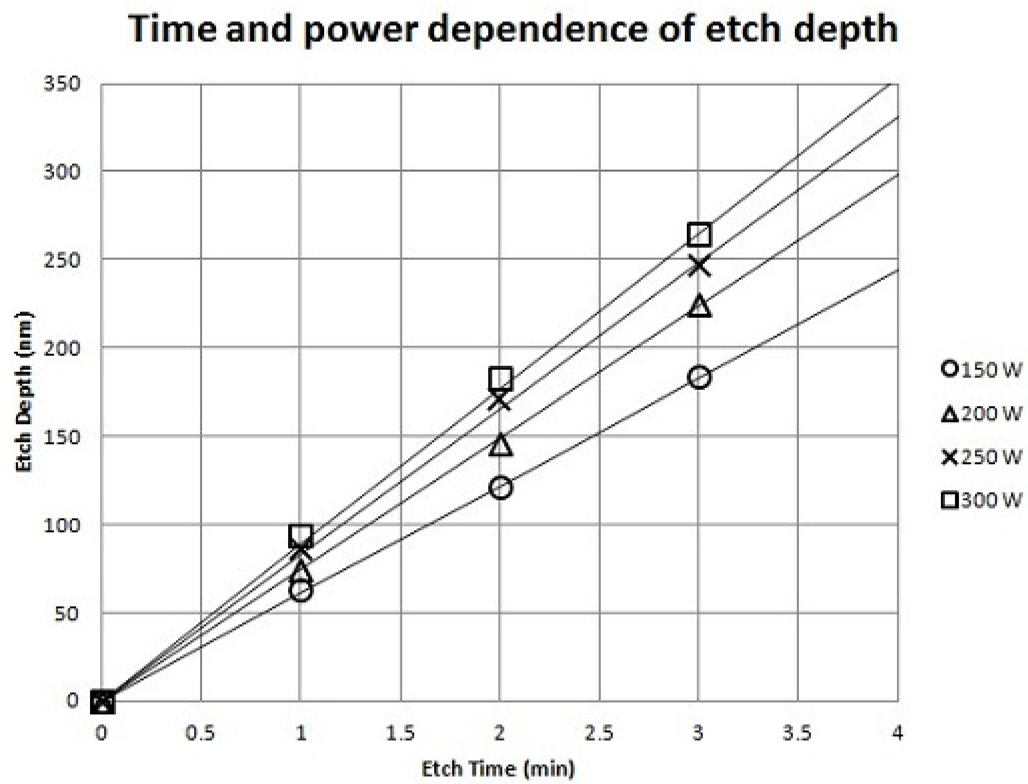

Power dependence of etch rate
Etch Rate (nm/min)
Power (W)
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350

SiN_x etch

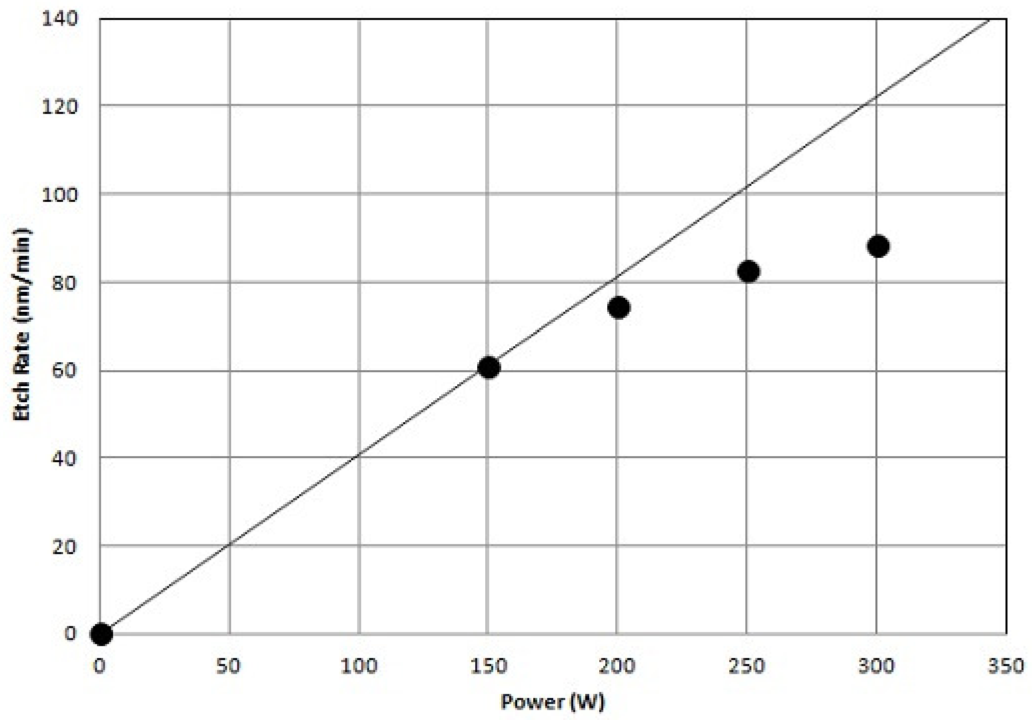
- O2 = 5 sccm
- CHF3 = 50 sccm
- Pressure = 20 mTorr
- Power = 150 W
- T = 17.5 °C
- Etching rate: 61 nm/min

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)



Power dependence of etch rate (1/9/2014)

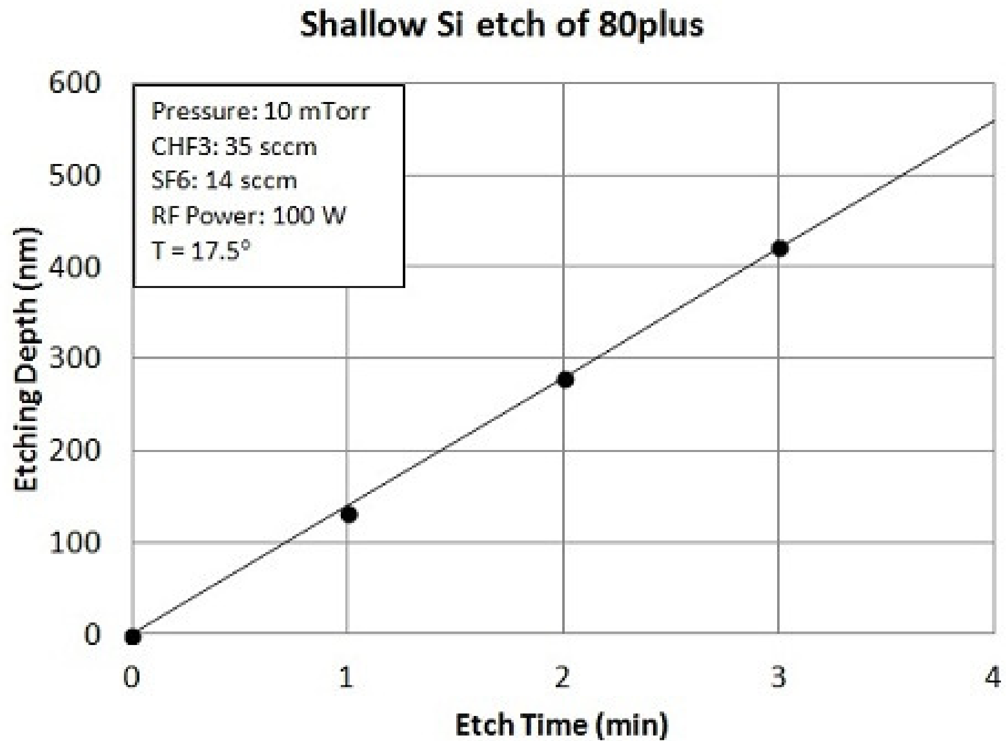


Shallow Si etch

- 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

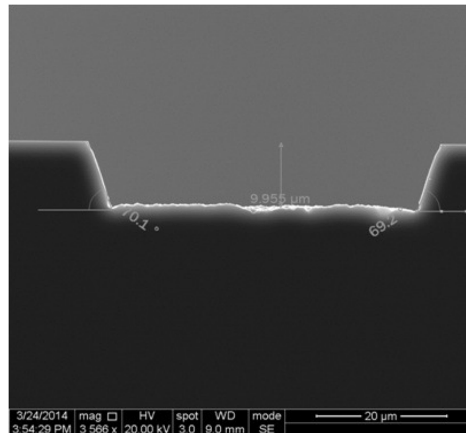


Deep Si etch

- SF_6 = 50 sccm
- O_2 = 10 sccm
- Pressure = 150 mTorr
- RF power = 100 W
- T = 20 °C
- Etch rate 500-700 nm/min (in the brochure)
- Selectivity to SiO_2 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 SiO_2 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.