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Thicknesses and Pinholes of SiO2, SiNx, and a-Si Films prepared by PECVD, No 2

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Keywords
Thicknesses, Pinholes, SiO2, SiNx, a-Si, PECVD

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Thicknesses and Pinholes of SiO2, SiNx, and a-Si Films prepared by PECVD, No 2, (Graduate Student Fellow Program)

Prepared by Dhruv Turakhia (11/10/2014)

SiO2 Thickness
- 10/20/14
- Default recipe
- Deposition rate = 60.2 nm/min
  - Filmetrics F50: thickness mean = 116.6 nm and uniformity = 1.2 % for 1.9 min deposition.
Surface Roughness

- 11/10/14
- Default recipe
- Thickness: 100 nm
- AFM image
  - 10 µm x 10 µm
  - PV: 5.64 nm
  - rms: 0.853 nm
  - Ra: 0.663 nm
Pin Holes
- 11/17/2014
- XeF2 Ecther
  - The number of cycles: 30
  - Etch time: 60 sec
  - The pressure of XeF2: 3.0 Torr.
  - The pressure of N2: 2.0 Torr
  - The following pictures are the surfaces of 25, 50, 100, 200, and 300 nm thick SiO2 after XeF2 etching.

Photos of Si etching using XeF2 through various film thickness of SiO2 prepared by PECVD
Optical microscope images (x32) of Si etching using XeF2 through various film thickness of SiO2 prepared by PECVD

Optical microscope images (x200) of Si etching using XeF2 through various film thickness of SiO2 prepared by PECVD
AFM images of the depression of the 200 nm thick SiO2 film after Si etching, assuming that SiO2 film was collapsed due to removal of the bottom Si through the pin hole.
Si3N4

Thickness

- 11/17/2014
  - Thickness mean = 145.9 nm and uniformity = 2.8 %.

Surface Roughness

- 11/17/2014
- Thickness: 100 nm
- AFM image
  - 10 µm x 10 µm
  - PV: 3.30 nm
  - rms: 0.556 nm
  - Ra: 0.440 nm
Pin Holes

- 11/17/2014
- XeF2 Ecther
  - The number of cycles: 30
  - Etch time: 60 sec
  - The pressure of XeF2: 3.0 Torr.
  - The pressure of N2: 2.0 Torr
  - The following pictures are the surfaces of 25, 50, 100, 200, and 300 nm thick SiO2 after XeF2 etching.

Photos of Si etching XeF2 through various film thickness of SiNx prepared by PECVD
Optical microscope images (x32) of Si etching using XeF2 through various film thickness of SiNx prepared by PECVD.

Optical microscope images (x200) of Si etching using XeF2 through various film thickness of SiNx prepared by PECVD.
a-Si (deposited on PECVD 100 nm thick SiO2)

**Thickness**
- 11/17/2014
- Filmetrics F50: thickness mean = 123.2 nm and uniformity = 2.5 %.
Surface Roughness

- 11/17/2014
- Thickness: 100 nm
- AFM image
  - 10 µm x 10 µm
  - PV: 2.10 nm
  - rms: 0.336 nm
  - Ra: 0.262 nm