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Taiwan Semiconductor Research Institute

CF-E16 (Samco 200ip Etcher)

Technical Information

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Samco RIE-200iP

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- ☑Processing up to ø230 mm (ø3” x 5, ø4” x 3, ø8” x 1)
- ☑Symmetrical evacuation design coupled to TMP
- ☑Excellent uniformity - less than ±5% @ø8”
- ☑Stable, reproducible process by ESC & He backside cooling
- ☑Chlorine chemistry process
- ☑Extensive process library
- ☑Versatile
- ☑Compact footprint
- ☑Global installed base of more than 350 chambers

ICP System

Tornado ICP Coil

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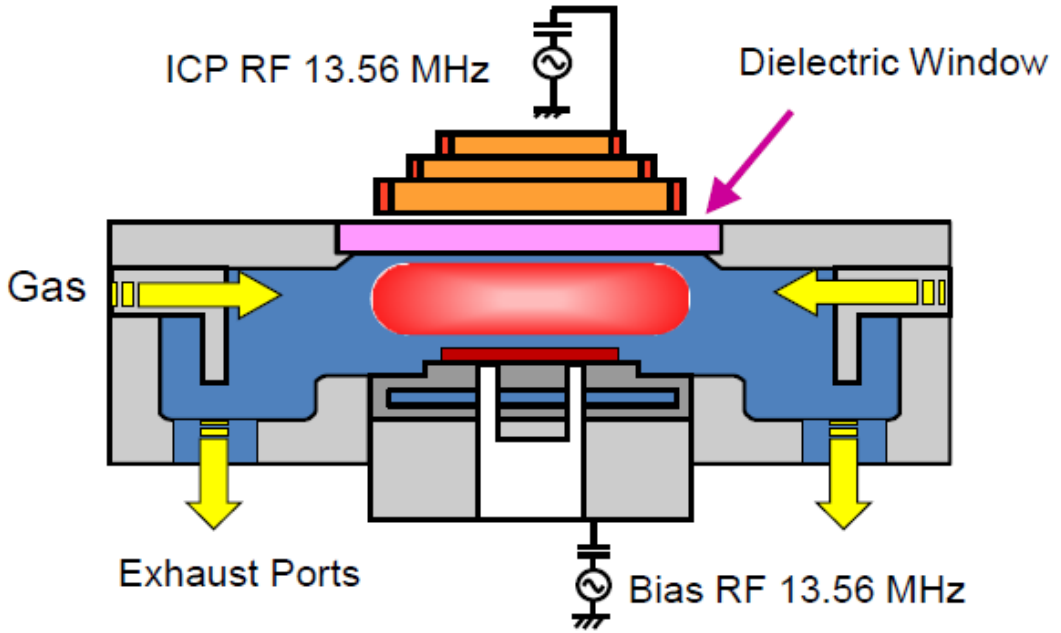
Tornado ICP® Coil

- Uniform Sheet of Plasma Across the Chamber
- Plasma formation from Low Powers & Pressures

Benefits

1. Uniform Etching
2. Etch Rate Control
3. Low Damage Processing



Tornado ICP Coil -Tuning Angle

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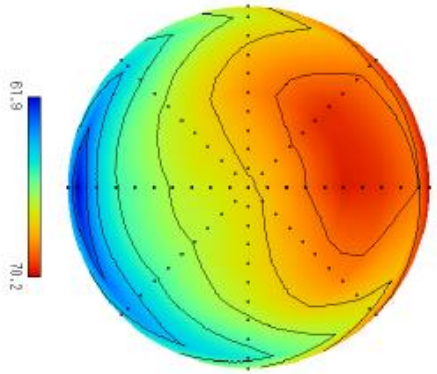
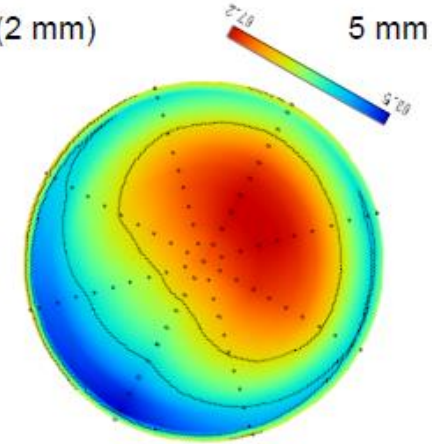
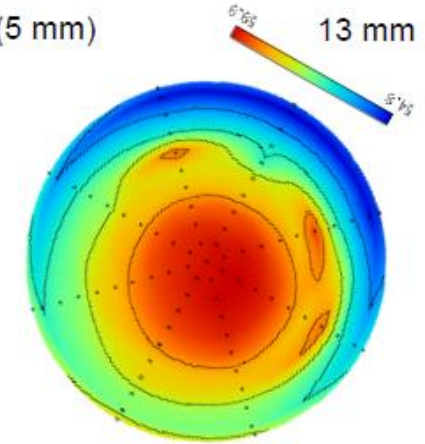
Adjust the coil angle

±2.82%@ø190 mm

Uniformity are for reference only and are not always guaranteed.
Performance depends on mask pattern and sample type.

No Adjustment	Adjustment 1 5 mm	Adjustment 2 13 mm
0 mm / 0 mm	(2 mm) / 5 mm	(5 mm) / 13 mm
		
0 mm / 0 mm	0 mm / (2 mm)	0 mm / (8 mm)

Tornado ICP Coil -Uniformity

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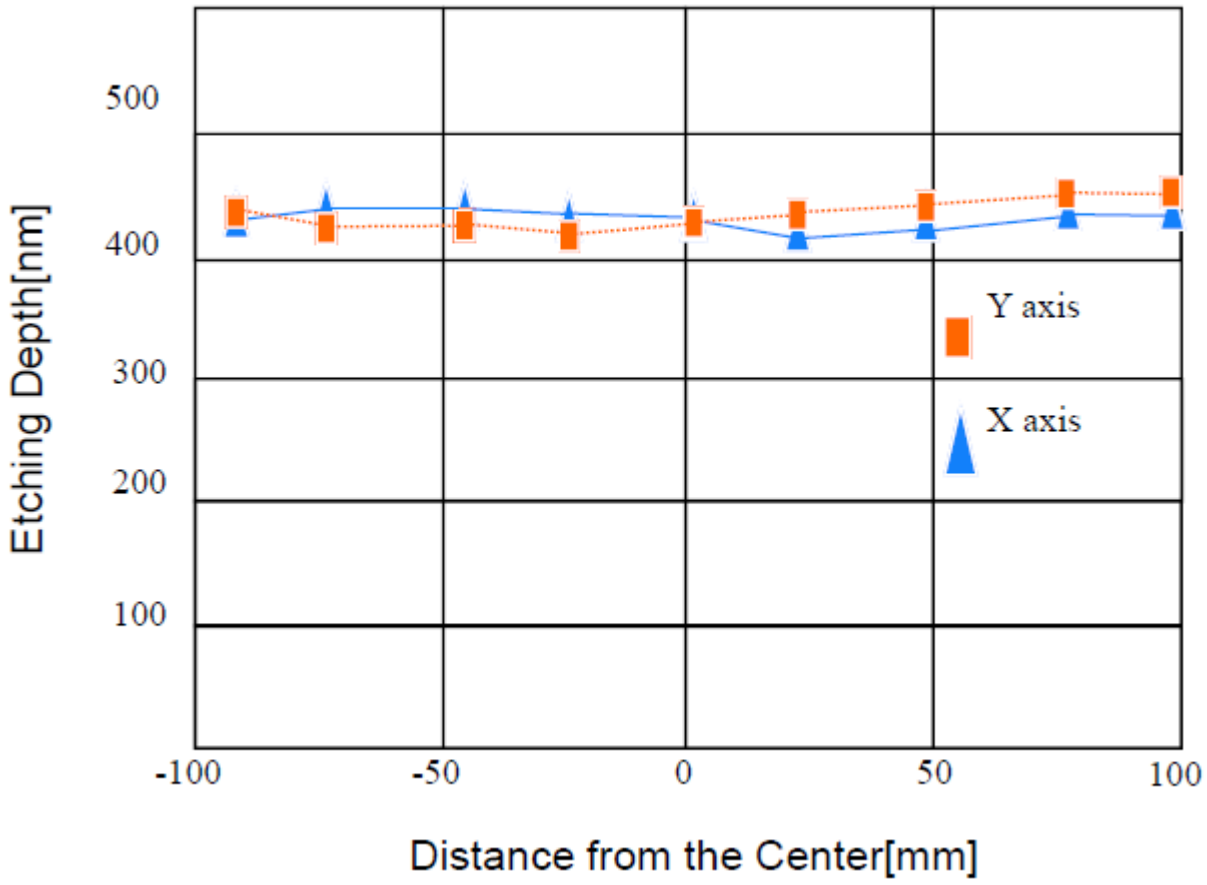
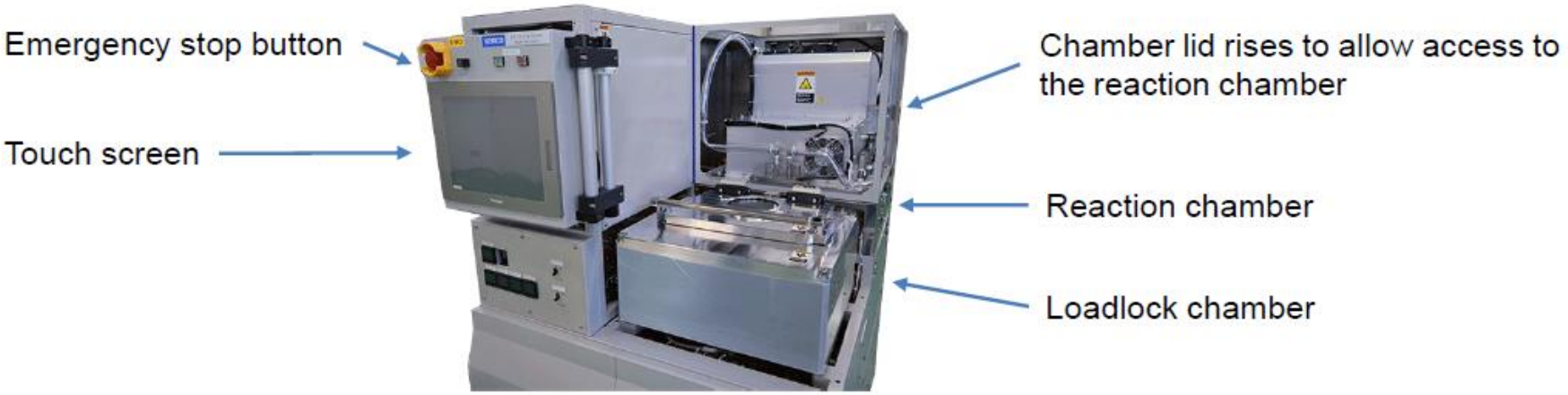
Highly uniform etching with proprietary Tornado Coil

Exceptional uniformity
over ø8 inch wafers

Depth: 420 nm
Material: SiO_2
Uniformity: ±2.5%



Hardware


Emergency stop button
Touch screen
Chamber lid rises to allow access to the reaction chamber
Reaction chamber
Loadlock chamber


Plasma resistant O-ring
Wafer guide ring
Wafer/carrier tray
Inner wall

Symmetrical Evacuation

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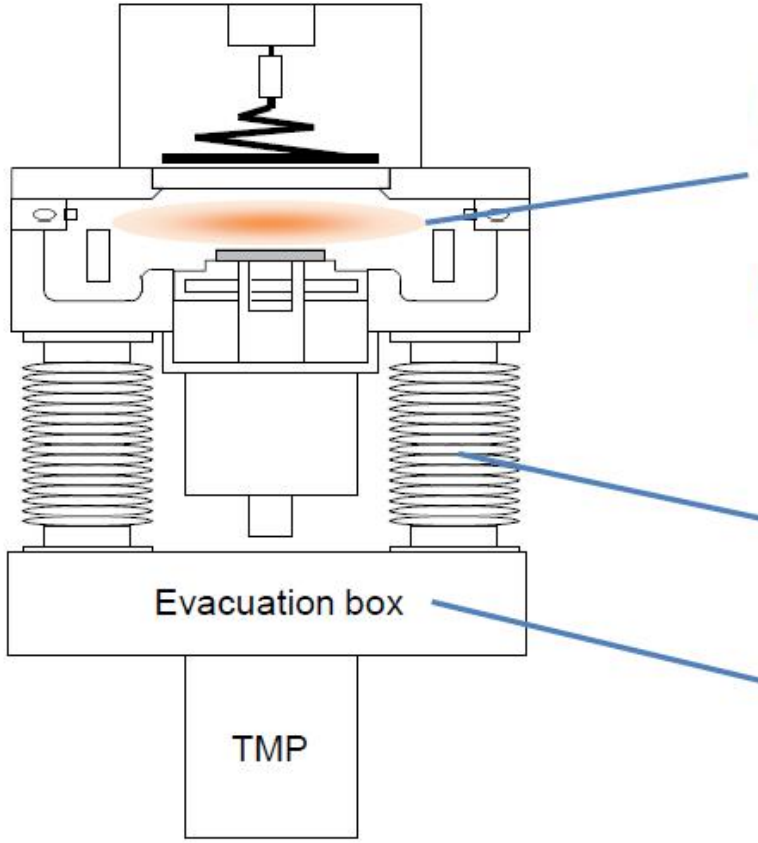
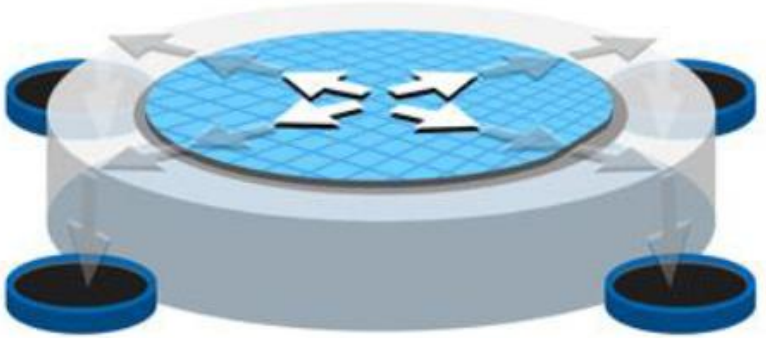
Process gas is uniformly evacuated from the four corners of the chamber for excellent uniformity.





TMP (for Ga-related materials)

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Field-proven reliability in the etching of Ga-related materials
- 1 year manufacture backed warranty for Ga etching.
- 1 year manufacturer backed for overhaul including rotor.

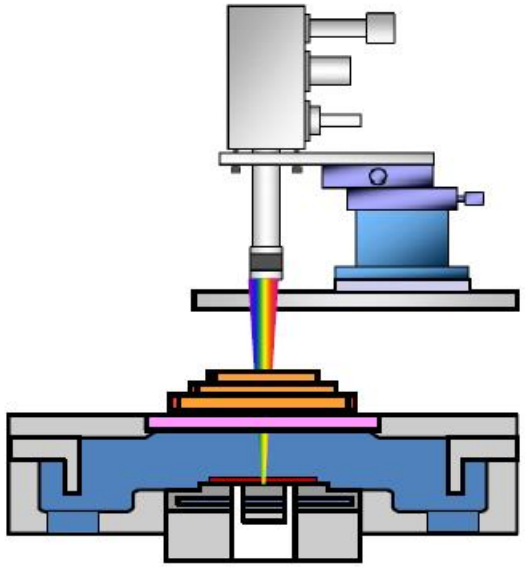
TMP rotor after using18 months
→Still working

Crashed TMP rotor

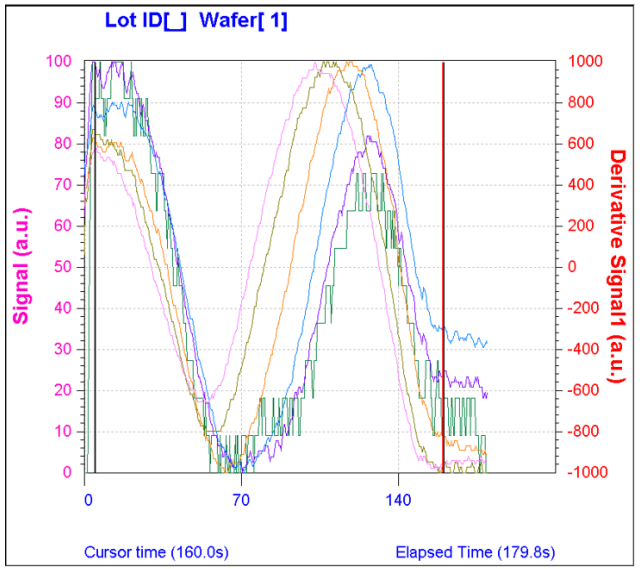
Interferometric EPD

Advanced view at multiple wavelengths simultaneously

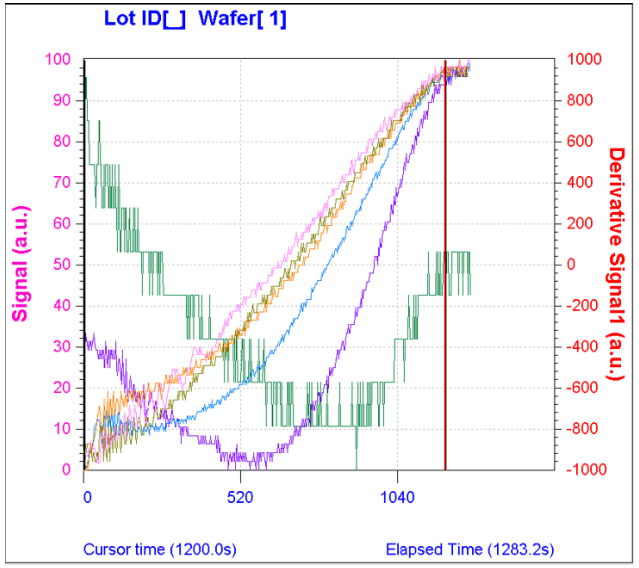
Manual or Automatic
X-Y Stage



P GaN EPD – SF6 etching



AlGaN EPD – Cl2/ BCl3 etching



Patented Anti-fog Window

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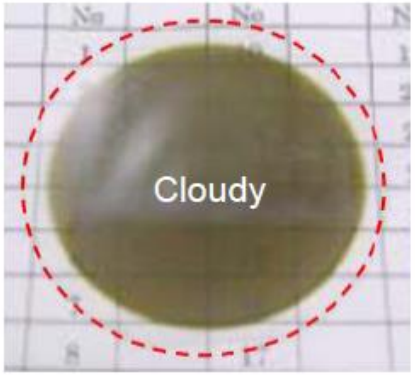
Maintenance-free endpoint detection

•Fabrication of optical, power and RF devices may require **in-situ monitoring** for ICP etching systems.

Problems

1. During the etching process, the window required by the in-situ monitor becomes cloudy and measurement becomes impossible.
2. Even if cleaning of the window is carried out during the chamber clean, etching by-products cannot be removed and the window must soon be replaced

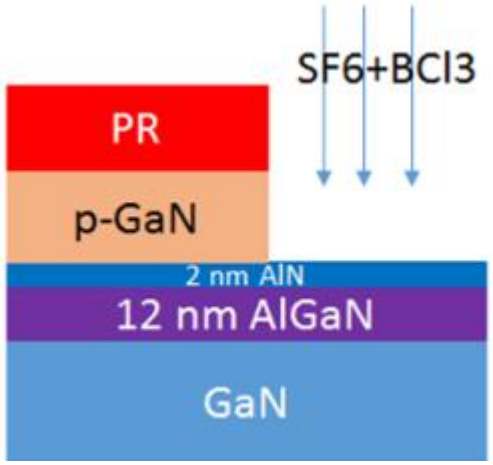


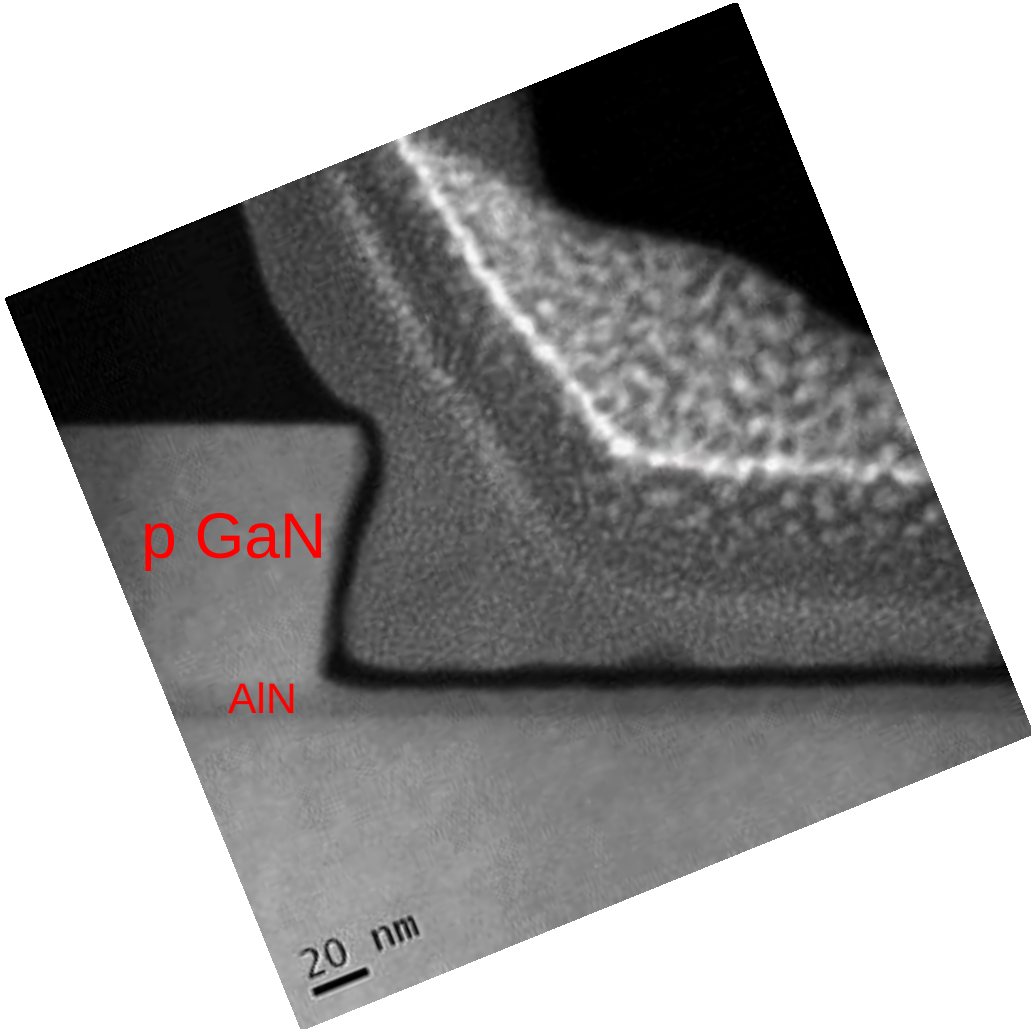
Solution

Samco' patented electrode structure prevents clouding of the window and allows accurate, continuous measurement.

P GaN/AlN High Selectivity Etching

Etching stop at the interlayer





Recessed Gate Etch Evaluationby AFM

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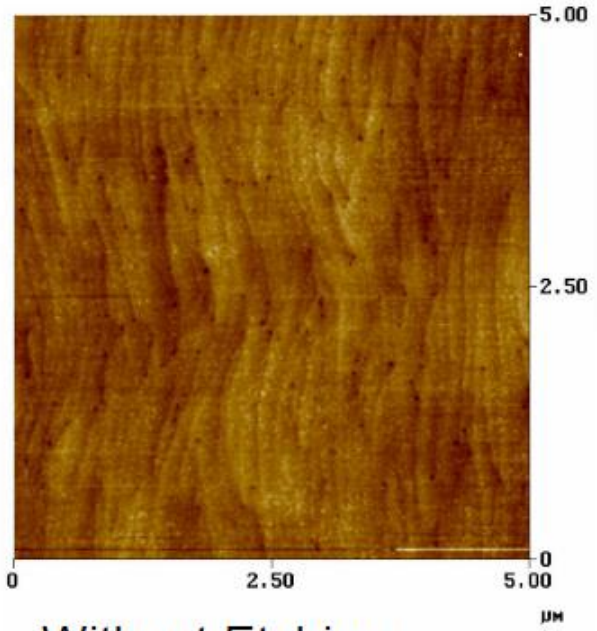
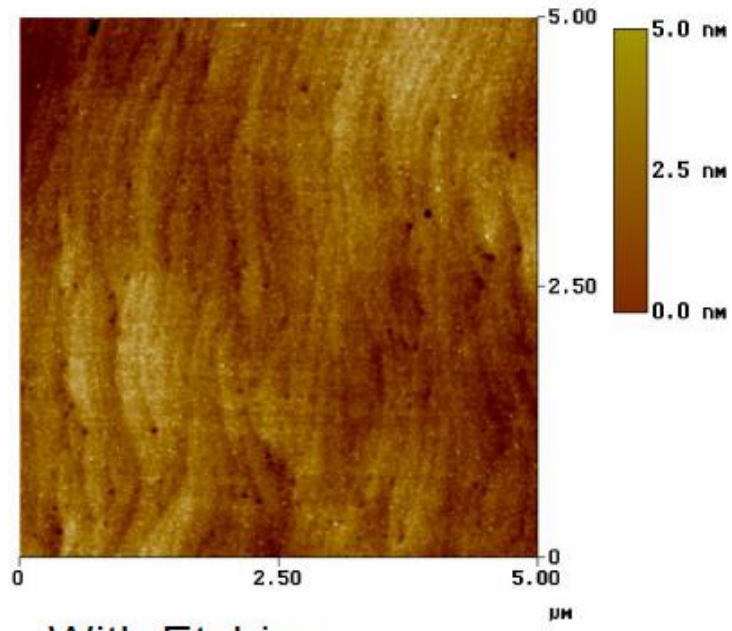
Smooth surface retained after etching



Without Etching

- RMS: 0.40 nm



With Etching

- Time: 30 min
- Depth: 38 nm
- RMS: 0.41 nm