

# NANOETCH PRODUCT OVERVIEW

| ETCH |

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# BENCHTOP ETCH SYSTEM

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## Flexible modes of operation




Unlock the full potential of reactive ion etching with our benchtop Nanoetch system—engineered specifically for high-performance fluorine-based RIE applications with soft-etch feature.

Designed for advanced materials research, NanoEtch delivers industry-leading precision, uniformity, and process repeatability essential for today's challenging etch requirements.

### Available Techniques:

-  **Fluorine RIE**  
Configured for use with the fluorine-chemistry etchant gases SF<sub>6</sub> or CHF<sub>3</sub>.
-  **Soft Etch Mode**  
Precisely-controlled low powers for etching applications involving highly sensitive materials

### Typical Applications

-  **Graphene Etching**  
Gentle and precisely controlled etching of graphene at ultra-low etch rates.
-  **h-BN Sidewall Etching**  
Using SF<sub>6</sub> as the etchant gas combined with soft etch control to remove 7-8 layers of material with minimal residual roughness.
-  **Si Etching**  
Using SF<sub>6</sub> and N<sub>2</sub>, it is possible to etch 25nm of Si in 20 seconds for applications such as HR stack layers.

# nanoETCH

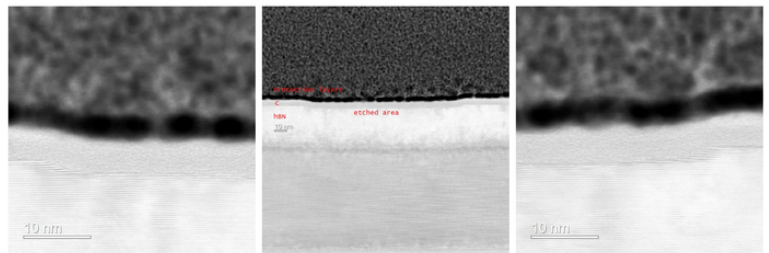
Compact benchtop system, designed to offer the ultimate in flexibility for substrates up to 6" / 150 mm in diameter.

- Simple touch-screen control
- Define/save multiple recipes
- Up to 3 MFC-controlled process gases
- Up to 6" diameter substrates
- Base pressure  $<5 \times 10^{-7}$  mbar



## Fluorine RIE

Despite its compact footprint, the nanoETCH delivers the capability to etch some materials that traditionally require a dedicated RIE system. Applications requiring the controlled etching of bulk h-BN, SiO<sub>2</sub> and bulk Si are perfectly suited to the nanoETCH.



TEM images of h-BN layers removed using Soft Etching with SF<sub>6</sub> etchant gas. Data courtesy of NANOMADE, DTU.

## Soft-Etch Mode

Low power plasma etching can be used as a final step in the cleaning of Si/SiO<sub>2</sub> substrates before deposition of 2D materials to promote adhesion, and remove residual organic contaminants left over from chemical cleaning.

The nanoETCH provides the capability to create RF plasma (up to 30 W) with fine power control down to 20mW and a user defined mix of Ar and O<sub>2</sub>.



Image 1: Graphene transferred onto an Si/SiO<sub>2</sub> substrate. A photoresist Hall bar pattern (yellow) is formed on top of the graphene.



Image 2: The photoresist is removed leaving the protected graphene without leaving any residue.



Image 3: A nanoETCH system is used to expose the sample to precision soft-etching conditions. The image shows the sample after graphene removal (no contrast across the Si/SiO<sub>2</sub> surface).

# Key Specifications

<b>Vacuum Chamber</b>	Stainless Steel 304 grade
<b>Pumping System</b>	Turbomolecular pump: Edwards nEXT85D or Pfeiffer HiPace 80 NEO Backing pump: Rotary (3 m3/hour or 8 m3/hour) or scroll (6 m3/hour) pump
<b>Base Pressure</b>	5 x 10 <sup>-7</sup> mbar
<b>Substrate Size</b>	Up to 6" diameter
<b>RF Output Power (max)</b>	30W
<b>Mass Flow Controllers</b>	Max 3 (options: Ar, O2, N2, CHF3, SF6)
<b>System Control</b>	7" touchscreen
<b>Process Control</b>	Strike Mode & Process Recipes
<b>Dimensions (approx)</b>	800 x 500 x 460mm
<b>Weight (approx)</b>	45-50 Kg

# MOORFIELD

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