

# ICP Etching System



## For Research & Development

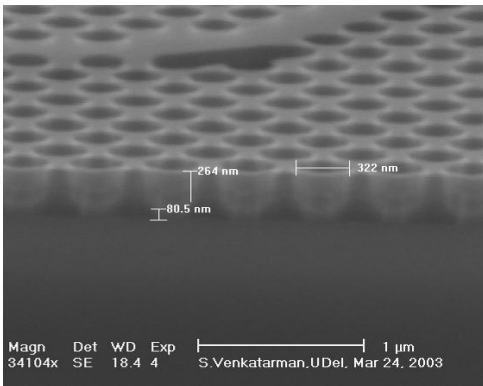


Tornado ICP®  
Patent #3790291

MODEL RIE-101iPH

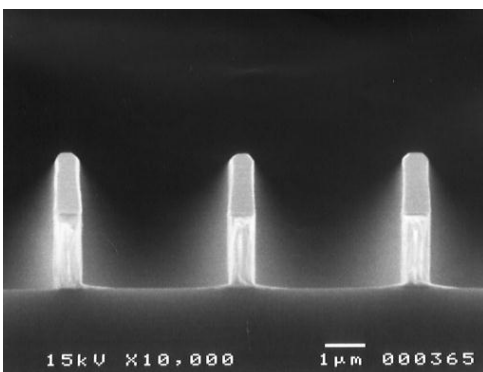
### Examples of Etching Process

#### —Si / InP Photonic Crystals—



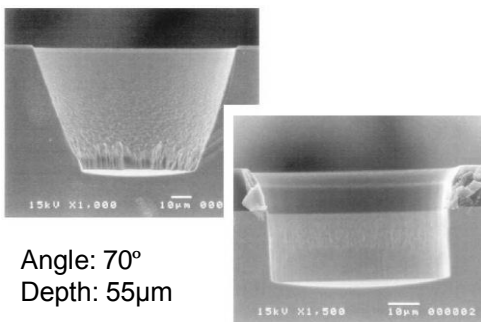
Width:320nm  
Depth:264nm

#### —Al Fine Pattern Etch—



Width: 500nm  
Depth:100µm

#### —GaAs Etch—



Angle: 70°  
Depth: 55µm

Etch Rate: >1µm/min  
Angle: 89°  
Depth: 24µm



The **SAMCO RIE-101iPH** is a load-locked type inductively coupled (ICP) etching system. The system designed for R&D customers who require a flexible system capable of etching a large number of materials in one system.

The system features SAMCO's proprietary Tornado ICP® configuration that efficiently generates a highly uniform, high density plasma. This enables the system to achieve precise pattern etching with high selectivity between the mask and etch materials with superior uniformity.

## Features

- **Proprietary Tornado ICP®** coil delivers highly uniform, high density plasma.
- Stainless steel chamber allows **easy cleaning and prevents corrosion**.
- Advanced chamber design allows advanced etching of a **large range of materials**
- **Control of the sample temperature** by electro static chuck
- Multiple spare ports allows **more analytical instruments** to be attached (*options*).

## Applications

- Anisotropic etching of silicon based films.
- Etching of metal films
- Etching of GaN, GaAs, InP and other compound semiconductor films
- Fabrication of waveguide devices
- High speed etching of Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>

## Utility Requirements

Power	•AC200V, Ø3, 60A
Cooling Water	•Above 2L/min for the electrode •Above 5L/min for the chamber
Exhaust Ducts	•Main body •Gas box
Gas Exhaust	•NW25 from two rotary pumps
Process Gases	•0.1MPa(G)
Compressed Air	•0.5~0.7MPa(G)
Nitrogen Supply	•0.1MPa(G) for chambers •0.05~0.1MPa(G) for rotary pumps

## System Specifications

Process Chamber	<ul style="list-style-type: none"> <li>• Stainless steel, 309.5mm diameter</li> <li>• 40mm diameter view port</li> <li>• 9 spare ports for analytical instruments (<i># of ports is dependent on specification</i>)</li> </ul>
Sample	•4" sample stage
Electrodes	ICP Electrode: •Tornado Coil Electrode® Lower Electrode: •Stainless steel, Ø106mm reactor
RF Power	ICP: •13.56MHz, 1kW, crystal oscillation •Auto matching BIAS: •13.56MHz, 300W, crystal oscillation •Auto matching
Load-lock Chamber	<ul style="list-style-type: none"> <li>•Aluminum, 451(W) x 308(D) x 146 (H)</li> <li>•Linear motion vacuum robot</li> </ul>
Vacuum System	Process Vacuum Line: •Compound turbo molecular pump (800L/sec) •Fomblin rotary pump (413L/min) •Variable conductance motorized gate valve Load-lock / Roughing Line: •SA-M rotary pump (413L/min)
Gauges	Process Chamber: •Diaphragm gauge, 1.33 ~ 1.6x10 <sup>-2</sup> •Ionization gauge, 1.3x10 <sup>-1</sup> ~ 1x10 <sup>-5</sup> Load Lock Chamber: •Pirani gauge, 3x10 <sup>-3</sup> ~ 4x10 <sup>-1</sup>
Gas Lines	•Four mass flow controllers (standard)
Operation	<ul style="list-style-type: none"> <li>•Fully automatic "auto" operation</li> <li>•Manual operation mode</li> <li>•Recipe storage - 100 Recipes, 10 steps per recipe</li> <li>•Safety interlocks to prevent errors in operation.</li> </ul>

## Options

BIAS Power	•300W → 500W
Pumps	•Rotary pump → dry pump •TMP for Ga etching
Circulators	•Room temperature •High temperature (for In containing materials)
Gas Lines	•Extra lines (up to 8 possible)



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<b>Japan</b> (Headquarters)	36 Waraya-cho, Takeda, Fushimi-ku, Kyoto 612-8443 Japan Phone : 81-75-621-7841 FAX : 81-75-621-0936 E-mail : itl@samco.co.jp URL : www.samco.co.jp
<b>USA</b>	532 Weddell Drive, Suite 5 Sunnyvale, CA 94089 USA Phone : 1-408-734-0459 FAX : 1-408-734-0961 E-mail : info@samcointl.com URL : www.samcointl.com
<b>Taiwan</b>	17F-8 Empire Commercial Bldg, 295 Kuang-Fu Rd., Sec. 2 Hsinchu 300 Taiwan, R.O.C. Phone : 886-3-516-5100 FAX : 886-3-516-5101 E-mail : samcotw@ms72.hinet.net
<b>China</b>	Room No.1410, Shanghai Overseas Chinese Mansion, 129 West Yan'an Road, Shanghai 200040 China Phone : 86-21-6249-4662 FAX : 86-21-6249-4663 E-mail : samcoshanghai@163.com