

BENCHMARK 800-III® ICP ETCH and DEPOSITION

THE AFFORDABLE HIGH-PERFORMANCE DRIE AND LOW TEMPERATURE PECVD PLASMA PROCESSING SYSTEMS

The BenchMark 800-III® Inductively Coupled Plasma (ICP) Processing System from AXIC, Inc. defines a new concept in Deep Reactive Ion Etch (DRIE) and low temperature-low damage Plasma Enhanced Chemical Vapor Deposition (ICP PECVD) plasma processing. The system is based on a modular design starting with a universal chamber and cabinet unit with ICP etch and deposition bottom electrodes available for easy installation into the chamber unit. We are confident you will find the ease of use, variety of plasma processes, serviceability and attractive pricing of the BENCHMARK 800-III® unsurpassed by any other plasma product in the market.

SYSTEM DESCRIPTION

In the research and development of plasma processing, there has always been a great need for a highly versatile and reliable tool. With the ever-changing requirements in plasma research, the system selected must offer the widest range of process parameters and a high degree of repeatability for process verification. It also must be easily modified for new process requirements. We believe that

our BENCHMARK 800-III® ICP etch/deposition plasma system satisfies these very demanding requirements.

The BENCHMARK 800-III® ICP tool is a plasma tool that can be used in research, process development or low volume production for precise etching and deposition on substrates up to 8" in diameter. The system can also accommodate pieces of wafer.

In designing the BENCHMARK 800-III® ICP tool, the prime directive was to create a system that incorporates the quality, reliability and process control capabilities of dedicated production-oriented systems, while drastically reducing cost, maintenance and floor space requirements.

The BENCHMARK 800-III® ICP tool's unique cabinet and electrode design allows for easy installation in a laminar flow module or cleanroom. Selection of proven, quality components, modular subassemblies, versatile chamber and electrode design, compact size, automation and field proven process recipes make the AXIC BENCHMARK 800-III® ICP tool the plasma engineer's "system of choice".



FEATURES

- ▲ Single-piece chamber construction
- ▲ 1,000W, 13.56MHz RF ICP Power
- ▲ 600W, 13.56 MHz RF Bias Power
- ▲ Auto RF matching
- ▲ Downstream pressure control
- ▲ Computer control with Windows 2000 operating software
- ▲ Pumping: Mechanical and turbo pumps for etching; mechanical pump with roots blower for deposition
- ▲ Field proven components
- ▲ Proven process recipes
- ▲ Endpoint detection (optional)

APPLICATIONS

- ▲ DRIE
- ▲ High rate and low damage etching
- ▲ Submicron etching
- ▲ Low temperature-low damage PECVD of SiO₂ and Si₃N₄
- ▲ Polyimide etching
- ▲ Passivation etching
- ▲ Carbon nanotube deposition

AXIC®

*Specialized Thin Film Equipment
X-Ray, Laser and Plasma*

APPLICATIONS

With its generous selection of processing modules, the BENCHMARK 800-III® satisfies a broad range of plasma processing conditions, from sophisticated submicron RIE etching to deposition of high quality PECVD films at low temperature.

Working closely with our large customer base, we have developed field-proven process recipes, guaranteeing that your system will be up and running from the day you install it. Only the highest quality subcomponents are used in manufacture, ensuring that your BENCHMARK 800-III® tool will provide the highest possible uptime, reliability, repeatability and serviceability.

SPECIFICATIONS

The popularity of the BENCHMARK 800-III® ICP tool is due primarily to its attractive cost of ownership and a highly versatile design, providing features and process benefits not found on most systems. These include a small footprint for laminar flow installations and multiple electrode configurations. Substrates up to 8" in diameter can be processed.

BASE SYSTEM

Basic components in the BENCHMARK 800-III® ICP tool include a Windows based PC controller with recipe storage, 4 channels of digital mass flow control with expansion of up to 6 channels, temperature compensated capacitance manometer for measurement of process vacuum, 100mm vacuum plumbing for maximum process gas conductance, KF or ISO fittings for ease of service, plus many other processing and service features. Gas lines are stainless steel with VCR connections.

PROCESS CHAMBER

The BENCHMARK 800-III® ICP tool's anodized aluminum process chamber is constructed from a unique "single-piece" design. ICP etch and deposition systems use the same chamber design. The chamber's upper portion contains the ICP coil and ceramic window. The lower portion contains the substrate electrode, the vacuum pumping port, and all necessary valves and vacuum monitoring equipment. An automatic hoist raises the upper portion of the chamber for easy access to the lower electrode.

ELECTRODES

The ICP coil and ceramic window are the same for both ICP etch and deposition systems.

The ICP etch electrode is specially designed for maximum performance in the lower vacuum ranges. The stainless steel bottom electrode is temperature controlled via an optional recirculating chiller and supplied with a dark space shield, containing the plasma between the ICP coil and bottom electrode.

The ICP PECVD bottom electrode is of similar design; however, it is capable of being heated to 400°C.

PLASMA SOURCE

1,000W 13.56MHz RF to the ICP antenna produces a plasma density up to 5×10^{11} eV/cm³ (in argon plasma) at a low plasma potential while the second 600W 13.56MHz RF power supply powers the substrate electrode for RF biasing. All power sources are solid state and air-cooled. Also supplied are automatic matching networks. In this

way, the ion energy and the ion density can be controlled independently. The ICP antenna is separated from the process chamber by a ceramic window, and the antenna is at atmospheric pressure outside of the plasma environment.

PROCESS PUMPING

The system is supplied with mechanical and turbo pumps for etching; mechanical pump with roots blower for deposition. Various sizes of these pumps are available based on the required vacuum processing levels.

PRESSURE CONTROL

A downstream pressure control is provided for more precise process control. A closed loop pressure control system is incorporated between the process chamber and process pump. The system includes a 100mm servo valve and pressure controller connected to the capacitance manometer in the process chamber providing for complete automation of the process pressure.

CONTROLLER

A Pentium computer is employed for complete system control. This includes a hard drive and CD ROM. Complete Windows 2000 software using multiple display windows for equipment control, data logging, recipe setup and storage, and system interlocking is provided. The system can be operated in automatic or manual mode.

OPTIONS

To further increase its capabilities, the BENCHMARK 800-III® ICP tool offers a broad selection of available processing options, including endpoint detection, water chillers, oil filtration and purging systems. Exhaust gas abatement systems can also be supplied.

DIMENSIONS

Width: 46.5" (118cm)

Depth: 37.5" (95cm)

Cabinet Height: 36" (91cm)

Total Height: 54" (137cm)

Weight: 350 - 500 lbs. (159 - 227kg) (depending on options)

UTILITIES

System: 230V, 50/60Hz, 20A

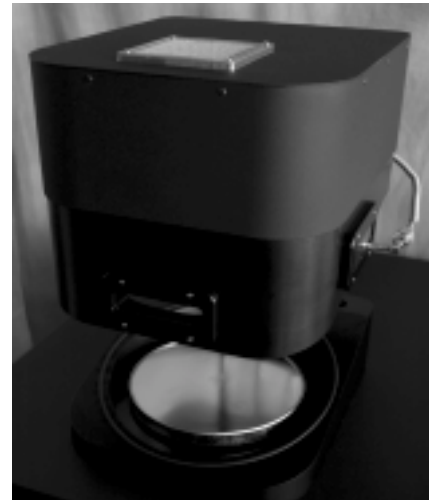
Pump: 230V, 60Hz, 10 Amps (mechanical only)
220V, 50Hz, 5 Amps

Water: For electrode cooling 1.5 gal/min (70 ± 5°F)

Air: For valve operation (80 psi)

N₂: For chamber vent (15 - 20 psi)

Gas: Process gases, VCR fittings



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