PHANTOM III

Reactive Ion Etch (RIE) System

The Phantom III is designed to supply research and failure analysis laboratories with state-of-the-art plasma etch capability using single wafers, dies or parts using fluorine and oxygen based chemistries. The system has a compact, modular design built on a space-saving platform.

Applications

Processes have been developed for either isotropic or anisotropic etching of silicon dioxide, silicon nitride and other materials requiring fluorinated or any non-toxic, non-corrosive chemistries. The Phantom III comes with full process support both prior to and subsequent to purchase. For a more detailed discussion of applications and processes, please visit www.triontech.com.

Tool Features

Reactor The cathode and anode are each machined out of single blocks of aluminum. After critical inspection they are hard anodized for protection from process chemistries. The bottom electrode is available in either 200mm or 300mm sizes and can process single wafers, dies or parts (2" - 300mm). Process gases are introduced into the chamber either by an annular ring or a showerhead manifold.

Automatic Matching Network The uniquely designed network is built in as an integral part of the bottom electrode assembly to ensure accurate tuning, low transmission loss and virtually no RF radiation outside the network itself. The network uses a phase magnitude sensor and amplifiers to provide instantaneous feedback for quick precise tuning.

RF Generator The system comes with a 600 watt, 13.56 MHz, solid state RF generator.

Touch Screen Operator Interface A color flat panel display with touch screen interface provides the operator with full process information at all times. The software interface guides the operator through each sequence in a logical fashion and gives fingertip control of all process parameters.

PC Process Controller The PC process controller provides simple and reliable system control. The graphical software package creates programs in block diagram form. Process recipes are stored on the hard drive or can be stored on USB flash drives allowing each operator to maintain individual recipes.

AC Distribution Module The AC distribution module automatically distributes predefined power quantities to the various internal components. When the Emergency Power Off button is tripped, the RF power is shut off and all valves involved with gas delivery are automatically closed and the machine powers down to a safe standby mode. This system includes separate power controls for the main AC and peripherals.

Automatic Pressure Control Every Trion system includes a butterfly pressure control valve operated directly by the process controller. This provides independent pressure control separate from all other processing parameters.

Gas Delivery System State-of-the-art technology is utilized to ensure the utmost integrity and purity. Each reaction chamber accommodates two mass flow controllers and all plumbing utilizes surface mount, C-seal technology or orbital welded VCR fittings.

Safety The system meets SEMI S2-93 safety requirements. The system is CE compliant with Machinery Directive 98/37/EC, the Low Voltage Directive 73/23/EEC and the Electromagnetic Compatibility Directive 89/336/EEC for CE Marking requirements. A third party safety review is available upon request.

Facilities Facility schematics can be provided upon request.

Advanced Options

Phantom LT RIE/ICP

Pumping Systems Each reaction chamber requires it's own pump. Trion can supply these as needed according to your requirements. There are mechanical, dry and turbo pump options available. You may choose to provide your own pump(s) or they can be purchased directly from Trion. All pump options provided by Trion are proven systems chosen to best meet your specific process needs.

Temperature Control An external chiller or heater/chiller recirculator may be recommended. By controlling the reactor temperature (bottom electrode), process reproducibility is greatly enhanced and the etch byproducts are more readily volatilized.

Endpoint Detection Trion offers both optical and laser endpoint detection options which allows the user to measure film thickness changes in-situ during the etch process. These systems are integrated into and controlled by Trion software.

Inductively Coupled Plasma Trion's carefully-engineered ICP is a proven option for applications requiring a downstream, high-density plasma source. It dramatically reduces radiation damage and contamination from RIE sputtering and greatly increases selectivity to other films. It allows for higher plasma densities as power is transferred into the bulk plasma via the magnetic field resultant from inductive coupling. This enables processing at lower pressure, which has a number of significant benefits. It allows for tight anisotropy in high aspect ratio structures and reduces microloading effect. Trion's ICP source will result in improved etch rates, profile control, uniformity and selectivity with a dramatic reduction in RIE radiation damage. The ICP comes with a 600 or 1250 watt, 13.56 MHz power supply and a built-in automatic matching network.

Electrostatic Chuck Maintaining cooler substrate temperatures during etching is often critical. Trion's electrostatic chuck holds the wafer securely to the chuck by electrostatic forces while flowing a small quantity of helium onto the backside of the wafer, providing significant cooling.