CVD Equipment Corporation

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UHV Thermal Evaporator / CVD System

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Standard Configuration

➤ Purifiers:

- Nitrogen
- Helium
- Hydrogen
- Hydrogen Chloride
- 100% Silane
- PPM Diborane P-Dopant
- PPM Phosphine N-Dopant

➤ Loadlock Vacuum System

- Turbomolecular Vacuum Pump nominal 300 liter/sec
- Dry Backing Vacuum Pump
- Bellows Flexible Lines - to reduce vibrations
- Vacuum Gauging
- A Vacuum Gauge Controller
- Vacuum plumbing lines and valves are stainless steel with Conflat or Cajon VCR fittings
- A Nitrogen backfill circuit
- Pumping the Loadlock to a base level of <5X10E-7 Torr and returning to atmospheric pressure is an automated sequence. All pumps, valves, vacuum gauging is automatically controlled.

➤ Transfer Chamber Vacuum System

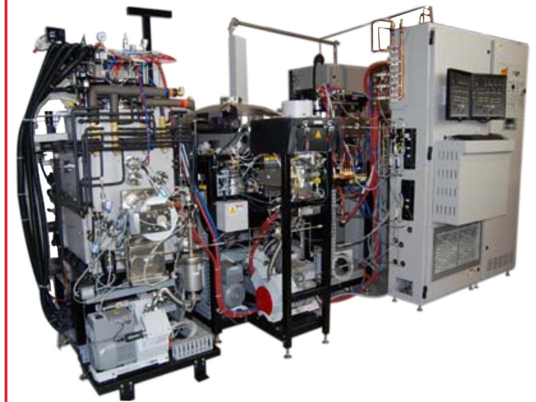
- Turbomolecular Vacuum Pump – nominal 600 liter/second
- Dry Backing Vacuum Pump
- Bellows Flexible Lines - to reduce vibrations
- Vacuum Gauging
- A Vacuum Gauge Controller
- Vacuum plumbing lines and valves are stainless steel with Conflat or Cajo VCR fittings
- A Nitrogen backfill circuit

CVD Equipment's Infrared Heated, Dual Chamber, Ultra High Vacuum Thermal Evaporator and Chemical Vapor Deposition System is an automatically controlled research unit for processing of 1 - 6" diameter or smaller wafers. The Thermal Evaporation Process Chamber can operate up to 900 degrees Celsius and the CVD Deposition Process Chamber at temperatures up to 1000 degrees Celsius.

The Thermal Evaporation Process Chamber Vacuum System is capable of pumping a clean Thermal Evaporation Process Chamber to a level of <2x10E-8 Torr at room temperature with no gas flows after a 24-hour bakeout. For a clean, baked-out chamber, loaded with a clean, baked-out Silicon wafer, and no gas flow, the pressure rise during heating will remain at <2X10E-7 Torr .

The Transfer Chamber Vacuum System is designed for pumping a clean Transfer Chamber to a level of <5X10E-7 Torr at room temperature with no gas flows.

Wafer Transfer Chamber



UHV Cluster Tool System

Thermal Evaporator Process Chamber, a high purity, round, vertical, stainless steel cylinder chamber is provided to accommodate up to a 150mm diameter wafer. The system is provided with an automatic wafer transfer system between the Transfer Chamber and the Thermal Evaporator Process Chamber. This allows the chamber to remain in an inert condition during wafer transfer. All O-Ring seals are dual O-Rings having a vacuum between the O-Rings to minimize leakage across the O-Rings.

The temperature controlled gold evaporator is interfaced with the microprocessor control system for automatic/manual control of the power to the evaporator heater. The evaporator contains a shutter. Easy access is provided for maintenance when required. A water- cooled, dual-crystal monitor is provided to monitor deposition rate and overall thickness.

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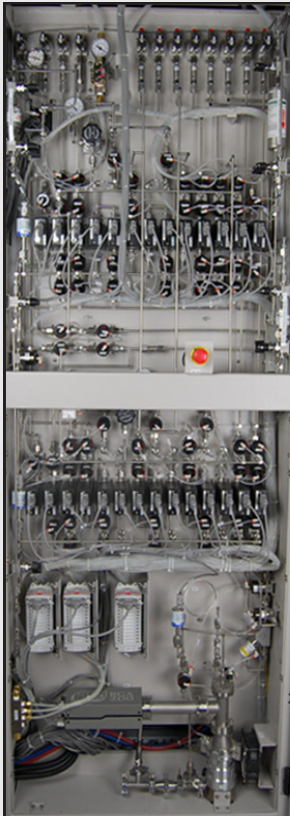
- Thermal Evaporation Process Chamber Vacuum System
- Turbomolecular Vacuum Pump – nominal 600 liter/second
- Inlet Assimilation Trap (particulate)
- Dry Vacuum Pump for roughing down of the process chamber to <100 MT and backing the Turbomolecular Vacuum Pump
- Bellows Flexible Lines - to reduce vibrations to exhaust plumbing lines and components
- Gate Valve - between the Transfer Chamber and Thermal Evaporator Process Chamber
- Soft-Start Vacuum Control System thru direct control of the vacuum pump
- A Vacuum Gauge Controller
- A Cold cathode Ion Gauge
- A 10 Torr Capacitance Manometer
- A 1000 Torr Capacitance Manometer
- Vacuum plumbing lines and valves are stainless steel with Conflat or Cajon VCR fittings

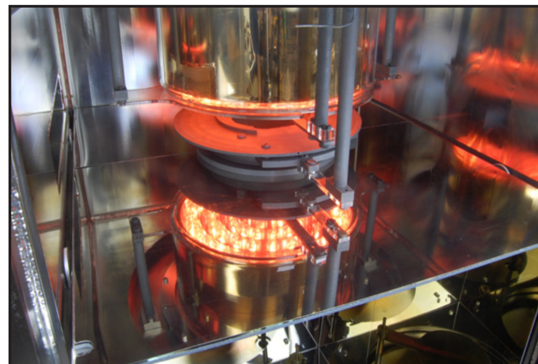


UHP Gas/Mixing System

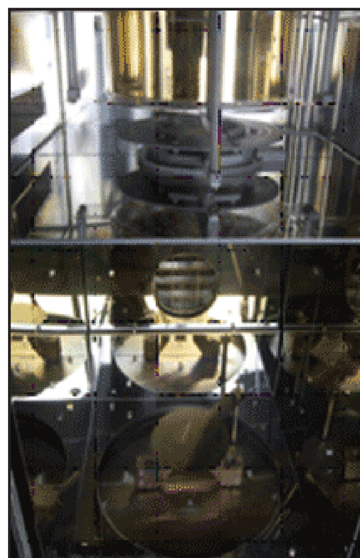
The gas system is designed to be in close proximity to the process chamber gas inlet to allow for close coupling between components and the process chamber. This provides for minimal line length, dead space and allows for fast gas switching – typically 30 milliseconds (if faster switching is required we can mount the electric solenoid that provides the pneumatic signal on the gas valve to provide approximately 5 -10 millisecond response).

Loadlock Vacuum System is designed for pumping a clean Loadlock Chamber to a level of <5X10E-7 Torr at room temperature with no gas flows.

316L stainless steel, bypass purifiers are provided. The 5-valve purifier manifold consists of dual, sequential manual inlet and outlet valves and a bypass valve on the purifier.



Thermal Evaporator Infrared Heater



Thermal Evaporator Chamber

CVD Process Chamber

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The CVD Deposition Process Chamber Vacuum System is designed for operation of the CVD Deposition Process Chamber at 1 to 500 Torr and is capable of pumping a clean process Chamber to a level of <5X10E-8 Torr at room temperature with no gas flows after a 24-hour bakeout. For a clean, baked-out chamber, loaded with a clean, baked-out Si wafer, and no gas flow, the pressure rise during heating will remain at <2X10E-7 Torr.

The Exhaust Gas Conditioning System continually thermally decomposes and oxidizes thereactive gases. This is accomplished by injecting air and the gases to be treated into a high temperature furnace (up to 950 degrees Celsius). In the furnace, the gases breakdown, thermally decompose, due to the high temperature, and combine with the oxygen in the injected air to form a particulate which is a relatively inert oxide compound of the reactive gas being injected. The particulate and remaining exhaust gases exit the furnace through a water-cooled exhaust line which cools the gases before being sent to the facility scrubbing system.

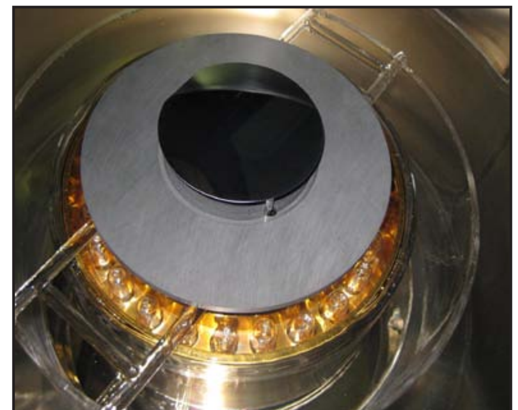
➤ CVD Deposition Process Chamber Vacuum System

- Corrosion resistant Turbomolecular Vacuum Pump – nominal 600 liter/second
- Inlet Assimilation Trap (particulate)
- Corrosive resistant Dry Vacuum Pump
- Bellows Flexible Lines - vibrations to exhaust plumbing lines and components
- Gate Valve - between the Transfer Chamber and Process Chamber
- Soft-Start Vacuum Control System thru direct control of the vacuum pump for pressures from 300 Millitorr to 760 Torr
- VAT Throttle Control Valve for pressures <300 Millitorr
- A Vacuum Gauge Controller
- A Cold cathode Ion Gauge
- A 1 Torr Capacitance Manometer
- A 10 Torr Capacitance Manometer
- A 1000 Torr Capacitance Manometer
- Vacuum plumbing lines and valves are stainless steel with Conflat or Cajon VCR fittings

➤ CVD Deposition Process Chamber

- Nitrogen
- Helium
- Hydrogen
- Hydrogen Chloride
- 100% Silane
- Dopant Dilution
- 1000PPM Diborane P-Dopant
- P-Inject
- 100PPM Phosphine N-Dopant
- N-Inject
- Spare #1
- Five (5) additional mass flow controlled lines can be added - consult factory.

User Interface Station



150mm Wafer in CVD Chamber