SPECIFICATIONS

LPCVD Furnace System

The Naval Research Laboratory has a requirement for a 4-stack furnace for up to 6" diameter wafer processing capability. The system must include the following:

1. 4-Stack configuration with two tube levels populated
2. Furnace, gas cabinet, scavenger, and load station
3. Heating element with up to 6" dia. wafer processing capability
4. Digital process and temperature controllers on populated tube levels
5. Vacuum pump system
6. All associated vacuum foreline plumbing and components
7. Quartz process tubes
8. System configured for TEOS Oxide and Polysilicon LPCVD processes

Furnace System

- Heating element and end blocks for up to 6" processing
- System Temperature Capability: 400-1100^{0}C
- Temperature Repeatability: $\pm$1.0 (400~600^{0}C), $\pm$0.5 (600~1100^{0}C)
- Max. Ramp-Up Rate: 20^{0}C/min.
- Max. Ramp-Down Rate: 5^{0}C/min.
- Type "R" control T/C's
- Water cooled heat exchanger
- Stainless steel scavenger per tube level
- 32" thermal flatzone
- 480 VAC, 50/60 Hz, 3 phase, 5-wire
- Size: Individual components must fit on freight elevator: 73" W x 83"H x 89"D and completed system must not exceed 16.5 feet in length.

Gas Cabinet

- Cabinet exhaust
- Cabinet doors to allow complete accessibility for service and maintenance
- Ample room for mounting auxiliary equipment
- Pre-plumbing to enter at top of cabinet (terminated with face-seal caps), includes pressure regulator and sub-micron filter.
- Vertical plumbing drops w/VCR connections to each appropriate tube level w/manual shut-off valve
- Plumbing assembly constructed of $^3/_8$ " (9.5mm) dia. 316L electro-polished s/s, orbital welded with micro-fit fittings in lieu of bends. The system must be helium leak checked prior to shipment

LPCVD TEOS Oxide Gas System

System consists of gas delivery lines, process gas lines, nitrogen purge line and a nitrogen backfill line

- All flow loops to include a MFC and N/C pneumatic valve

- Plumbing assembly constructed of $^1/_4$" dia. electro-polished stainless steel tubing. The system must be assembled in a clean room environment and helium leak checked prior to shipment
- System assembled with face-seal type fittings on metal tray for mounting in source cabinet
- Safety interlocks for safe operation of all processes, thus in the event of a power failure only N2 flows
- All interconnecting electrical cabling to process controller to be provided
- N_2 purge capability on toxic/corrosive gas lines
- N_2 flowline with fixed flow orifice and flow monitor for vacuum pump case purge
- Vacuum gate valve, throttle valve and particle filter included
    - To include a TEOS vaporizer and LMFC delivery system complete with heaters. Does not include chemicals or chemical container.
    - Temperature Controller (1500cc) & Control Unit

Polysilicon LPCVD Gas System

System consists of gas delivery lines, process gas lines, nitrogen purge line and a nitrogen backfill line

- All flow loops to include a MFC and N/C pneumatic valve
- Plumbing assembly constructed of $^1/_4$" dia. electro-polished stainless steel tubing. The system is assembled in a clean room environment and helium leak checked prior to shipment
- System assembled with face-seal type fittings on metal tray for mounting in source cabinet
- Safety interlocks for safe operation of all processes, thus in the event of a power failure only N2 flows
- All interconnecting electrical cabling to process controller to be provided
- N_2 purge capability on toxic/corrosive gas lines
- N_2 flowline with fixed flow orifice and flow monitor for vacuum pump case purge
- Vacuum gate valve, throttle valve and particle filter included

LPCVD Process Chamber Assembly

- Domed end quartz process tube with Load End Vacuum Door/Flange Assembly
- The flange is machined from stainless steel, has an O-ring which seals with the process tube and a cushion O-ring to protect the end of the process tube
- The flange to have two inlet ports for gas injectors plus an inlet and outlet connection for the cooling medium. Transition lines to be included.
- The flange can be cooled with either water or air
- All necessary vacuum plumbing (gate valve, throttle valve, traps and filters) between pump and system to be included

Desired Features in Digital Temperature/Process Sequence Controller (one per populated tube level)

Temperature Ramping

* High Resolution, bipolar analog output
* Electrically isolated from other functions
* Furnace set-point capability

* Individual set-points for each cycle
* Automatically ramped over cycle duration

Digital Inputs and Outputs

* At least 16 relay-isolated outputs
* At least eight optically isolated inputs
* “Interlock” inputs for programmable branching
* “Wait” inputs for programmable holds

Multiple Process Recipes

* At least 16 recipes
* Each recipe includes at least 100 steps
* Programmable “idle” cycle for each recipe
* “Count-up” cycle at end of each recipe
* Battery Backup
* Programmable Time Base (Minutes/Seconds)
* Programmable Alarms
* Manual Mode
* Alphanumeric Status Messages
* Simultaneous Programming and Operation

Analog Outputs and Inputs

* At least eight 0 to 5 volt analog outputs/inputs
* Multiple set-points for each output
* Display of analog set-points and actual
* Analog inputs monitor process parameters
* Programmed branching on analog inputs
* Total-Time -Remaining Display
* Manual Abort
* Power-up Diagnostics
* Completed Runs Counters
* Power-Fail Software
* Built-in Recipes for OEM applications