Tender No.201700941

Specifications for Plasma Chamber for Doping, PECVD deposition and Etch

Process chamber
- Chamber material: Aluminum
- Substrate loading/unloading: Automatic loading/unloading by Loadlock
- View port with shutter
- Cleaning cover
- Process gas is injected from a gas distributor unit.

Substrate unit
- Wafer size & capacity: 4 inch, 1(one) wafer
- Ion accelerating power: Negative pulsed high voltage power (minimum range -500V to -5kV)
- Pin up & down by air-cylinder/Pneumatic control

ICP source unit
- Uniform plasma density suitable for 4inch wafer processing
- ICP cavity wall: quartz made and Dome shaped is preferred
- Water cooling for RF coil

Negative Pulsed High Voltage Power Unit
- Output Voltage: -500 to -5kV minimum range
- Output Current: 2.5 A, average (approximate)
– Pulse width : 10 ~ 100 [μsec] minimum range
– Output Frequency : 0 - 1 KHz Max. minimum range
– High Voltage Protection : Over load, Over voltage, Over heat
– Cooling : Water cooling
– Electricity (Power) : 380V, 70A, 3phase

RF generator
– Output power : 600W minimum
– Frequency : 13.56MHz
– DC self bias display

RF matching network
– Automatic matching type
– Frequency : 13.56MHz

Vacuum Systems
Vacuum pump
– Dry pump : 1,500 L/min (Maker: Pfeiffer) - (Model number : A124H (Pfeiffer) or equivalent)

– TMP: approximately 700L/sec@N2 (Model number : Hipace 700C. "C" means corrosive type)
– Ultimate pressure : 5×10-6 Torr
Pressure gauge
- Maker: Atovac-Korea or equivalent
  – Low vacuum gauge : Conveertron gauge
  – High vacuum gauge : Hot cathode ion gauge
  – Pressure readout & cable kit

Pressure control
- APC (Automatic Pressure Controller)
- Electrical Throttle valve
- Baratron gauge : Full scale 1Torr (Maker: Inficon or equivalent)

Vacuum valves & lines
- All valves Pneumatic type
- Auto vent line
- Stainless steel hard line and flexible bellows line

Loadlock chamber
- Substrate tray capacity : One(1) wafer
- Automatic transfer operation

Vacuum unit
- Rotary pump : 600L/min
- Ultimate pressure : $5 \times 10^{-3}$ Torr
Pressure gauge
- Low vacuum gauge: Convectron gauge
- Pressure readout & cable kit

Vacuum valves & lines
- Roughing line valve: Pneumatic type angle valve
- Soft pumping line valve: 1/2inch Pneumatic type diaphragm valve
- Auto vent line
- Stainless steel hard line and flexible bellows line

Used gases & flow control
- Process:
  Ar: MFC (Maker: MKS)
  CHF3: MFC (Maker: MKS)
  O2: MFC (Maker: MKS)
  PH3: MFC (Maker: MKS)
  B2H6: MFC (Maker: MKS)
  SiH4: MFC (Maker: MKS)
  PN2 – Purge & vent:
  N2: Metering valve
Gas valves & gas line
– Pneumatically operated diaphragm valve
– Metering valve for N2 purge & vent
– The gas line is helium-leak tested to 10-9 Torr·L/sec.

System control
– System is controlled by PC automatically & manually
– MS Window 7 Pro or equivalent
– Labview or equivalent
– Industrial PC (PENTIUM, 17” LCD monitor or equivalent)
– Including analog & digital input/output card
– Process control software
– User friendly screen & easy Graphic User Interface (GUI)
– Process data logging
– Recipe edit, save, download, run

Main Frame
– Electrical power drive panel (ON/OFF/Emergency switch)
– RF power control panel
– Vacuum & pressure control/display panel
– Gas flow control/display panel

System frame is mild steel
– White & Blue colored panels & frame covers
– 19inch control panel mountable
– Easily movable casters & leveling foots

**Chiller for substrate cooling unit**  *(OPTION)*
– Working temperature : 4 ~ 30°C
– Refrigerator capacity : ¾ Hp
– Flow rate : 40 L/min

**Technical Data**

*May be obtained from equivalent system during tendering.*

**Implantation Data**

**Boron-doping**

Please provide SIMS data for doping concentration vs depth

- Various bias [500V – 5kV] for fixed time e.g. 60s; anneal 900degC 60s
- Various time [40-200s] for fixed bias e.g. 500V and 2kV; anneal 900degC 60s
- Various activation / diffusion anneal temperature [900degC, -1000degC, 60s, N2] for fixed implant [e.g. 2kV 60s];
- Provide sheet resistance vs. anneal temperature (800-1000 degC) data for typical implant [2kV 60s]

1. **B Doping Specification to be demonstrated on-site** with detailed specs for acceptance

**Doping 2kV time 60s, Post 900degC 60s N2 anneal:**

Peak concentration at surface > 1e20/cc

**Doping depth at 1e18/cc is < 40nm**
<200ohms/sq sheet resistance at 1000degC
10% NU across water 5mm edge exclusions

Phosphorus Doping

Please provide SIMS data for doping concentration vs depth

- Various bias [500V – 5kV] for fixed time e.g. 60s; anneal 900degC 60s
- Various time [40-200s] for fixed bias e.g. 500V and 2kV; anneal 900 degC 60s
- Various activation / diffusion anneal temperature [900 degC, -1000 degC, 60s, N2] for fixed implant [e.g. 2kV 60s];

**Doping 2kV time 60s, Post 900degC 60s N2 anneal:**

Peak concentration at surface >1e20/cc (optional)

Doping depth at 1e18/cc is <40nm (optional)

Provide sheet resistance vs. anneal temperature (800-1000 degC) data for typical implant [2kV 60s]

<200ohms/sq sheet resistance at 1000degC
10% NU across water 5mm edge exclusions

2. **PhosProcess needs to be demonstrated on-site with approximate specs.**

IIT Bombay will enable testing on-site.

**SiO2 deposition data**

Please provide SiO2 deposition data at 30 degree C (target >50nm/min approx.)

3. **SiO2 deposition process needs to be demonstrated on-site with quoted specs.**
Etch Data

Please SiO2 etch rate for deposited SiO2 (target >30nm/min approx.)

4. SiO2 etch process needs to be demonstrated on-site with quoted specs.

On-site Acceptance Tests

In addition to basic chamber function like base pressure and process control, the following tests must be demonstrate on-site for acceptance.

1. B Doping Specification to be demonstrated on-site with detailed specs for acceptance
   a. Doping 2kV time 60s, Post 900 degC 60s N2 anneal:
   b. Peak concentration at surface >1e20/cc
   c. Doping depth at 1e18/cc is <40nm
   d. <200ohms/sq sheet resistance at 1000degC
   e. 10% NU across water 5mm edge exclusions

2. Phosphorus process needs to be demonstrated on site with approximate specs.

3. SiO2 deposition process needs to be demonstrated on site with quoted specs.

4. SiO2 etch process needs to be demonstrated on site with quoted specs.

On-Site Commissioning

System must include minimum (2) days on-site assistance by supplier at IITB to commissioning the equipment and issue user training.

References

Provide international list of installations (at least 10 ) of equivalent system with contacts of at least users from 3 sites for feedback

Provide Indian list of installations (at least 3) of either equivalent plasma system

Provide list of trained service engineers in India and approximate response times.

Provide remote service methodology (e.g. call, computer with remote log-in, site-visit etc.) with Korean experts.
Spares & Maintenance

Please provide a quote with a list of spares for 1 year
Please provide preventive maintenance requirements and details including maintenance tools (provide pricing for any proprietary tools needed).

Warranty

Please specify 1 year warranty and 2 year AMC cost

Freight and Insurance

Pricing must include freight, insurance, and packaging to IITB.

The system may come in one or multiple packages. Each package not exceeding the size below (lab freight elevator size constraint) and then reassembled onsite quickly

900mm W, 1900mm D and 1900mm H