**ORDER DESCRIPTION**

1. **Subject of the order**

The subject of this tender is the delivery, installation and launching of an Ion Beam Etching system

as part of an ion leyers etching station at the Purchaser location according to the specifications detailed under point 5, as well as personnel training, according to the list of requirements under point 2.15.

The Contractor will provide warranty and service:

1. The warranty shall be granted for the period: minimum of 24 months from the date of delivery confirmed by a protocol of receipt;
2. The Contractor shall provide free of charge service for the duration of the warranty, the time to proceed with the repair will take place within 2 working days from the moment of reporting the defect;
3. The Contractor shall provide post-warranty service for at least 15 years after the delivery;
4. The Contractor shall provide access to spare parts and accessories to the system for at least 15 years after the delivery;
5. The Contractor shall provide the necessary accessories and spare parts, to repair the defect within no more than 5 working days after the consultant's visit or online inspection and finding the defect;
6. The Contractor shall provide support over the course of its business activity by telephone and e-mail in less than 24 hours;
7. The Contractor shall provide technical support including free of charge updates and possibilities to extend the device through the product life cycle;
8. The Contractor shall ensure that the service technician's response time and travel time to the customer is within a maximum of 2 working days from the notification also after the warranty period has expired.
9. The Contractor shall ensure the possibility of training in system operation during and after the warranty period and throughout the whole product life cycle;

Additionally, the Contractor will meet the following requirements:

a) The Contractor shall provide training at the Contractor's premises in order to demonstrate the system, present processes and teach how to operate the system in accordance with point 2.15 of the specification contained in section 2;

b) The Contractor shall ensure compliance with the CE declaration.

1. **The scope of the contract**

The order includes:

1. vacuum chamber,
2. vacuum pumping package,
3. vacuum pressure measurement,
4. ion source,
5. beam neutralization,
6. power supply and control system,
7. substrate stage,
8. automatic load lock,
9. system automation,
10. gas handling,
11. substrate chiller,
12. set of consumable parts,
13. system documentation and manuals,
14. launching,
15. training,
    1. technology principles,
    2. operation and maintenance,
    3. process strategies and tactics,
    4. data acquisition and interpretation,
    5. process development at the location of Purchaser,
16. service,
17. warranty,
18. documentation in English or Polish.
19. **Evaluation criteria**

Offers will be evaluated on a points scale with a maximum of 100 points.

|  |  |  |
| --- | --- | --- |
| Criterion | Maximum number of points (S) | Awarding method |
| Net Price (P) | 65 | S x Pmin/Pi |
| Duration of the guarantee period (W) | 35 | S x Wi/Wmax |

Where:

* Pi, Wi, are the price, device warranty period, respectively,
* Pmin, Wmax, are respectively the minimum price of the delivery of device among all offers, the maximum warranty period of the device among all offers.

The final score will be calculated by summing up the partial components and then rounding to two decimal places (rounding up from "5")

1. **Deadline for the contract’s execution**

The tool shall be at the Contracting party’s site not later than 26 weeks from the day of the sign a contract.

1. **Technical specifications**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Part | Parameter/Function | Description |
| 1 | Vacuum chamber | Size | * ≤ 600 mm x ≤ 500 mm |
| Material | * polished 304 series stainless steel |
| Cooling | * exterior welded water channels |
| Ion source port | * horizontal 305mm (12in) Conflat ™ (CF) chamber side port |
| Pump port | * vertical 335mm ISO F-250 flange chamber top port |
| Viewport | * 114mm (4.5in) CF flange viewport with rotational shutter |
| Gauge ports | * 70mm (2.75in) CF flange ports and mini CF ports |
| Auxiliary ports | * 114mm (4.5in) CF port for SIMS installation * 118mm (4.625in) CF port for non-immersed neutralizer installation * spare 70mm (2.75in) CF flange ports |
| Door | * hinged front door with substrate stage mounted on door center * o-ring door seal |
| Liners | * removable interior chamber liners made from low sputter yield titanium |
| Load-lock port | * horizontal 308mm (12in) O.D.CF port |
| 2 | Vacuum pumping | High vacuum | * turbomolecular high vacuum pump with nominal pumping speed ≥ 2200 lit/sec |
| Mechanical pump | * primary vacuum rough and backing pump with nominal pumping speed ≥ 65 m^3/h |
| Auxiliary pump | * stage (sample mount) vacuum chuck and differential pump |
| Valves | * Electro-pneumatic, normally closed KF40 isolation valve on roughing line for turbopump |
| Vent | * valve with a gas diffuser and filter for backfilling the chamber with either argon, dry nitrogen or dry air |
| Base pressure | * new, baked and conditioned * ≤ 9x10^-8 Torr (1.2x10^-7 mbar) in 24 hours, with load lock |
| Pump down | * new, baked and conditioned * ≤ 5x10^-6 Torr (6.7x10^-6 mbar) in 30 minutes from atmosphere * ≤ 1x10^-6 Torr (1.33x10^-6 mbar) in 60 minutes from atmosphere * ≤ 9x10^-8 Torr (1.2x10^-7 mbar) in 24 hours, with load lock |
| Process pressure | * new, baked and conditioned * ≤ 5x10^-4 Torr (7x10^-4 mbar) at working gas loads |
| 3 | Vacuum measurement | Measurement range | * pressure range from 760 Torr (101325 Pa) (1013 mbar) to less than 1x10^-8 Torr (1.33x10^-6 Pa) (1.33x10^-8 mbar) |
| Crossover | * active management of crossover range and threshold pressure to protect gauge elements |
| 4 | Ion source | Beam size | * >= 15 cm |
| Mounting | * direct mount on a 12” O.D. Conflat™ flange |
| Grid diameter | * ≥ 15 cm diameter aperture pattern |
| Ion optics | * 2 grid * self-aligned * molybdenum |
| Beam current | * user adjustable, 0-800 mA with filament neutralizer |
| Ion beam energy | * user adjustable with range from 100 to 1200 eV |
| Voltage and current variance | * beam voltage variance < 0.3 V at 1200 V * beam current variance < 0.1 mA at 88 mA |
| Power | * nominal beam power range from 30 mW/cm^2 to 1550 mW/cm^2 over 100 mm diameter substrate |
| Plasma discharge | * DC discharge with 20 to 100 V range * switchable dual filament cathode in case of failure * applied magnetic field from multipole permanent magnet rack * smooth, contiguous metal anode |
| Pulsing | * beam pulsing capability |
| Gas load | * 20 sccm Ar at 500 mA at 2.5x10^-4 Torr |
| Neutralization | * automatic beam neutralization |
| Cooling | * radiative * no direct (in-vacuum) water cooling |
| 5 | Power Supply and Control | Technology | * integrated control of AC, DC switch mode power supply |
| Control | * voltage, current, & power regulation with closed active feedback loops for ion beam power, neutralizer output and gas flow |
| Integrated | * AC for cathode & neutralizer and DC for discharge, beam, accelerator, and gas flow modules |
| Output | * rated total maximum output: 2500W * beam supply rating: 1200V, 1200mA, DC * discharge supply rating: 100V, 13A, DC * accelerator supply rating: 600V, 1200mA, DC * filament cathode supply rating: 40V, 30A, AC < 100Hz * automatic switching cathode * filament neutralizer supply rating: 40V, 25A, AC < 100Hz * gas flow supply rating: ±15V, 0-5V, DC, 1-8 channels |
| Voltage stability | * regulated voltages: beam, accelerator, discharge, flow |
| Current stability | * active current feedback loops: beam, emission |
| Optional operational modes | * plasma discharge only for warm-up and conditioning * enabled beam for automatic and regulated processing * manual for diagnosis and special operation |
| Responsivity | * fast output power response * beam continuity during grid & plasma arcs |
| Reliability | * power limits and control to protect ion source, substrates & circuits with electronic clamps and low output stored energy |
| Compliance | * CE compliant |
| 6 | Substrate Stage | Size | * 1x100 mm diameter dri-chuck grooved vacuum platen to accommodate one 100 mm diameter substrate * possibility to mount two 2 inch wafers onto single 100mm diameter vacuum chuck stage platen for smaller wafers * possibility to mount other size small samples * additional platen to mount one 3 inch diameter substrate |
| Platen | * vacuum chuck with evenly spaced radial and circumferential channel grooves to uniformly distribute vacuum (or gas) from central orifice, resulting in uniform pressure differential * platen made from OFHC copper with a hard nickel/chrome plated surface |
| Cooling | * no substrate exposure to pastes or oils * substrate backside cooling by conductive heat transfer through solid elastomeric dri-chuck thermal interface pad to vacuum chuck platen * platen temperature range from 5 ℃ to 40 ℃ * Si substrate temperature less or equal 65 ℃ after 30 minutes bombardment with 300 mW/cm^2 ion beam and power uniformity within +/- 5% over the 100 mm diameter |
| Motion | * stable rotational range from 0 to 30 rpm * user can select speed * hollow shaft ferrofluidic feedthroughs with no sliding O-ring water seals exposed to vacuum |
| Tilt angle | * motorized control of ion incident angle with 0.1° increments and position resolution with calibration at system start-up * tilt range of operation +/- 135° with stage normal parallel to ion source axis * stage tilt oscillation between user selected angle setpoints |
| Mounting | * substrate directly mounts onto Dri-chuck pad which lies on the grooved surface of a vacuum platen |
| Access | * mounted on front door of chamber * stage tilts to horizontal position allowing access for substrate mounting and system service |
| Shutter | * pneumatically actuated rotational stage shutter on a ferrofluidic feedthrough |
| Shielding | * low sputter yield titanium shields |
| Load Lock | * automatic load lock * video camera mounted on etch chamber and display monitor on load lock to show user position of wafer load/unload |
| 7 | System Automation and User Control | GUI | * flat panel touch screen display with dual point touch with optical sensing for use with cleanroom gloves * graphical display of equipment status and measurements * real time numerical and graphical presentation of operational status and process measurements |
| Logging | * all operating instructions, actions and process parameters are logged with each run * process steps and acquired data logged and stored in run files and folders available for local observation or export to user device |
| Recipes | * simple menu driven interface to define process recipes, process timing and sequencing * ability to edit, save, load, and run etch recipes |
| Access | * user access to all process variables, including important process components such as ion beam, plasma discharge, gas flow, pressure, neutralizer, substrate stage, pumping * multi-tiered user access, i.e. super user, supervisor/maintenance, operator |
| Control mode | * one touch automation for pump-down, gas flow, pre-process conditioning, ion beam etch runs, and venting * manual control mode available and used as needed |
| Remote control | * network accessibility and remote control for software upgrades, training, troubleshooting and operation, including etch process runs |
| Emergency Machine Off | * EMO switch available |
| 8 | Gas Handling | MFC | * mass flow controller (Ar) for ion source * electropolished tubing fitted with VCR fittings from MFC to chamber connection * metal-sealed fitting with Nickel gaskets * minimum of 4 gas lines |
| 9 | System Size and Cabinet | Frame | * stainless steel frame with stainless steel panels |
| Wheels | * electric cabinet with wheels and wheel lock |
| Vacuum Chamber Footprint | * ≤45” long by ≤40” deep |
| Electric Cabinet Footprint | * ≤25” wide by ≤40” deep by ≤80” high * powder coated steel panels |
| 10 | Chiller | Output Temperature | * 5 ℃ to 40 ℃ |
| Temperature Stability | * +/- 0.1 ℃ |
| Coolant Fluid | * water or blend with inhibitors * initial charge supplied by the Contractor |
| Refrigeration circuit | * air or water cooled |
| 11 | Consumable Parts | Parts included | * complete set of o-rings and gaskets * 1 set of cathode and neutralizer filaments * insulator kit for ion optics * 1 set of internal chamber liners * 2x viewport glass covers * thermal transfer pad * nuts and bolts |
| 12 | Factory Acceptance Test | FAT | * Etching of 200nm gold layer on 30nm titanium layer on sapphire * Etching and conversion of structured HgCdTe p layer. Sample at 30° angle. Etching depth 1 µm |
| 13 | Site Acceptance Test | SAT | * Etching of 200nm gold layer on 30nm titanium layer on sapphire * Etching and conversion of structured HgCdTe p layer. Sample at 30° angle. Etching depth 1 µm |
| 14 | Training | Topics | * as stated in point 2.15 |
| Materials | * training materials |
| 15 | Service | Response time | * as described above in point 1. Subject of the order |
| Maintenance | * scheduled maintenance service plans |
| 16 | Warranty | Period | * 24 months |
| 17 | System Performance | Etch rate | * Au > 110 nm/min * Ti > 25 nm/min * non-uniformity is less than or equal to ± 3% min/max over 100 mm diameter substrate * repeatability is less than or equal to ± 3% min/max over 100 mm diameter substrate |
| Cooling performance | * temperature on the substrate surface is ≤ 65°C |

1. **Additional information**

All delivered parts must be new, unused. Parts must be packaged in a way that ensures safe transport. Elements will be checked for compliance with the specifications given above. In case of lack of compliance elements will be returned to the Contractor. All matters regarding the Contractor’s liability for non-compliance of the delivered goods with the technical specification included in the detailed description of the above order, are regulated by the delivery agreement, which will be concluded between the Contractor and the Ordering Party.

In addition to the above, the Ordering Party requires the Contractor to provide the instruction manual for the Object of the tender in Polish or English.