Technical specification of the electron beam evaporator:

The electron beam evaporator system is divided into several components listed below. A schematic drawing is included at the end of this document.

A. Vacuum chamber: The vacuum chamber consists of a main chamber, housing the electron beam source, and a sample chamber, above the main chamber, with the ability to rotate and tilt the sample stage (GLAD). The chambers should be separated by a pneumatic controlled gate valve.

Additional chamber specifications are below:

A1: Main chamber:

1. Box chamber (approximate size - width ~ 30 cm, depth ~ 35 cm, height ~ 35 cm)

2. O-ring sealed front door covering the front side of the chamber completely. The front door should have a viewport, and manually operated shutter. The front door could be either hinged or sliding type.

3. Water cooled chamber

4. Quartz crystal with thickness monitor controller.

5. Two spare KF25 on the side of the chamber (not in the line-of-sight with the source).

A2: Sample chamber:

1. A 5 or 6-way tee like chamber with front loading door, a manually controlled sample stage rotation and tilt.

2. A hinged style front door with a viewport.

3. One side blank port (CF100) is for a possible upgrade with KDC40 (Kauffman & Robinson) source for in-situ sample cleaning. It must be designed such that the mounting of KDC40 leaves 10-12 cm between the filament and sample holder. Technical drawing can be supplied on suitable request.

3. A CF16 port to attach gas manifold for Argon and Oxygen. Include MFC (please provide the make in the technical compliance document) and Swagelok valves. The flow should be settable anywhere in the range 0-100 sccm on both MFCs. The Swagelok valves on the gas manifold should terminate with a SS flexible bellows, which can be connected to the pressure regulator of a compressed gas cylinder.

4. Sample stage should be in line-of-sight with the source.

5. Sample stage distance from source ~50-55 cm

6. A spare KF25 port (not in the line-of-sight with the source)

A3: Additional details of the vacuum chamber:

1. The gate-valve between main-chamber and sample chamber should have a pneumatic control.

2. The gate-valve should allow a deposition over at least 4” diameter of the sample holder.

3. The sample stage should have independent manual control over sample rotation and tilt (GLAD configuration).

4. A manually operated gate-valve between the turbo-pump (see Vacuum section for details) and sample chamber. This is to allow in-situ Argon cleaning at elevated pressure in dynamic mode.

5. 1 Substrate holder to mount 2" standard wafer with necessary flexible clips etc.

6. 1 Substrate holder to mount small pieces (5 mm x 10mm) with necessary flexible clips etc.

B. Electron-beam source and power supply:

1. Power supply 10kV, 6 kW and sweep controller

2. 270-degree beam deflection (hidden filament) configuration with 6 (or more) crucibles with circular rotation configuration

3. Crucible liner volume- at least 7cc

4. Water-cooled

5. Manual control of crucible rotation

C. Vacuum pumps:

1. Main chamber – Cryo-Pumping unit (preferably from CTI cryogenics) to reach the base pressure less than 4X10-8 mbar. Pumping capacity ~ 1500 L/s (air). The pumping should be able to operate 24X7 hours. Include a suitable dry pump for regeneration. Water-cooled single-phase cryo-compressor.

2. Sample chamber – at least 250 L/s turbo pump with suitable dry backing pump of pumping capacity of > 15 m3/h.

D. Others:

1. Suitable Chiller for water cooling of complete e-beam system (including cryo-compressor if needed). Provide details in the technical document.

2. All the shutter/movable feedthroughs MUST be isolated (magnetic connection, Wilson-type seal is not allowed). All the manual valves must be bellow-sealed.

3. Vacuum gauges with digital display to measure the pressure of the chamber from 1000 down to 1x 10^-8 mbar accurately (preferably from Pfeiffer Vacuum).

4. Semi-automatic control over pumping and venting of chamber and load-lock.

5. The system must have interlocks such as on the chamber vacuum levels, cooling water etc. Further, the system is to be designed to handle power failure events without any damage to pumps and e-beam supply. Include these details in the technical document, else it would lead to the disqualification of the bid.

6. Include the length of He-bellows for the cryo-pump (distance between cryo-pump and compressor) in the technical document.

7. Control system (Pump controller, PC/Laptop, Gun-supply, GUI-controller etc.) must be inside a rack cabinet including pumps, power supply, gauges, display, monitors, controller etc. Computer control and GUIs for easy control of the system during deposition. Provide details in the technical document.

8. The vendor should have previous experience of supply of ebeam system along with GLAD in reputed Indian Institutes and Research Organizations. Provide a list of Indian/Foreign customers (giving name, address, email, phone) with similar systems, where the base-pressure mentioned above has been demonstrated.

9. Comprehensive warranty and support for 1 year

10. The lead time for the delivery of the equipment should not be more than 90 days from the date of receipt of our purchase order. It should be clearly mentioned in the technical and commercial bids.

Additional items:

1. Appropriate UPS back up (for 30 mins backup with full load)

2. 6-bar dry-air compressor for pneumatics.

3. KDC-40 ion source from Kaufman and Robinson (or any other make with similar specifications)

Acceptance criteria:

1. Vendor must provide original warranty certificate and original invoice with the system from OEM for all imported items. Vendor must submit copy of air waybill for all imported items.

2. Drawings must be submitted for approval after the purchase order release and before the manufacturing of the system commences.

3. Vacuum level and multi-layer thin film deposition must be demonstrated on the provided samples by Ebeam, in vendors facility before dispatch. Evaporation materials will be provided by IISc.

4. The base pressure should be demonstrated after completing the installation at IISc.

5. All the feedthroughs and welded joints to be He-leak tested with background < 1 x 10^-9 mbar-l/s at the time of installation.

6. Training for 2 users from IISc should be provided to make them well familiar with the operation of various components and successful growth of the thin films using the given deposition unit at IISc.

7. Payment: 100% payment after installation and acceptance.

Purchase of additional items in subject to the budgetary constraints. Commercial Quotations along with Technical bid must be submitted in two cover system. Technical bid must contain a point-by-point technical compliance document. A schematic drawing of the system is included below. Pre-tender meeting for any technical clarifications can be scheduled with the undersigned by sending an email.

The purchaser reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to the award of contract without thereby incurring any liability of the affected bidder or bidders.

The vendors must submit their commercial and technical bid (in two cover system) no later than 5 pm, 27 September 2019.

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