INDIAN INSTITUTE OF TECHNOLOGY MADRAS
Chennai 600 036

Telephone : [044] 2257 8356/8368 FAX : [044] 2257 0545/8366
E-mail: arpp@iitm.ac.in

Ref: ELE/13-14/264/DSTX/SOUM **Date: 17.01.2014**

Tender No.: ELE/SOUM/023/2013

Due Date: 10.02.2014, 3:30pm

N.E. Nagaraj
Special Officer (Project Purchase)
IC&SR, I.I.T. Madras

Dear Sirs,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of various Scientific Instruments (i) "Integrated Glove Box and (ii) Solar Cell measurement Unit" conforming to the specifications given in Annexure.

I) Instructions to the Bidder

(i) **Preparation of Bids:-** The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.

(ii) **Delivery of the tender:-** The tender shall be sent to the below-mentioned addresses either by post or by courier so as to reach our office before the due date and time specified in our Schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule. The tender box is kept in the office of the "Special Officer, Project Purchase" IC & SR Building 2nd floor, I.I.T. Madras, Chennai – 600 036.

(iii) **Opening of the tender:-** The offer/Bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and it will be examined by a technical committee which will decide the suitability of the bid as per our specifications and requirements. The financial offer/bid will be opened only for the offer/bids which technically meet all our requirements as per the specification. The bidders, if interested, may be present on the financial tender opening Day which will be communicated to you.

(iv) **Prices:-** The price should be quoted in nett per unit (after breakup) and must include all packing and delivery charges to Various Institutions. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However the percentage of tax & duties should be clearly indicated.

The price should be quoted without custom duty and excise duty, since I.I.T. Madras is exempt from payment of excise duty, and the custom duty will be paid at concessional rate against duty exemption certificate.

In case of import supply, the price should be quoted on FOB and CIF basis indicating the mode of shipment.

(v) **Agency Commission**:- Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in Tender even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate about the percentage of payment and it should be included in the originally quoted basic price, if any.

(vi) **Terms of Delivery**:- The item should be supplied to our Various Institutions as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.

(vii) IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.

Yours faithfully,

N.E. Nagaraj
Special Officer (Project Purchase)
IC&SR, I.I.T. Madras.

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SCHEDULE

I) Important Conditions of the tender

1. The due date for the submission of the tender is **10.02.2014, 3:30pm.**

2. The offers / bids should be submitted in two bids systems (i.e.) Technical bid and Financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms etc. The Technical bid and Financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Limited Tender / Open Tender for supply of ""**Integrated Glove Box and (ii) Solar Cell measurement Unit** " should be written on the left side of the Outer bigger cover.

3. (i) EMD should be at 2% (Two percent) of the tender value quoted by the company. The EMD should be included in the Financial bid which will not be opened for Technical evaluation. **Enclosing the EMD in the Technical bid will automatically disqualify the tenderer.** EMD should be in the form of DD in favour of "The Registrar, Indian Institute of Technology Madras" and payable at Chennai. The tender without EMD would be considered as UNRESPONSIVE and REJECTED. Photo/FAX copies of the Demand Draft/Banker's pay orders will not be accepted. No interest will be paid for the EMD and the EMD (Bid Security) will be refunded to the Successful bidder on receipt of Performance Security.

   (ii) The Successful bidder should submit Performance Security of an amount of 5% of the value of the contract. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from commercial bank will be an acceptable.

   (iii) The Performance Security should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations

4. If an Indian agent is involved, the following documents must be enclosed:

   i) Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
   ii) Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
   iii) The enlistment of the Indian agent with Director General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.

5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.

6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.

7. Documentary proof for the claimed position and repetition accuracies must be obtained from the principals and submitted along with the relevant pages of the standards.

8. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.

9. **Validity:** Validity of Quotation not less than 90 days.

10. **Delivery Schedule**:- The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.

11. **Risk Purchase Clause**:- In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

12. **Payment**:- No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation is agreed to wherever the installation is involved. In case of import supplies the payment will be made only through Letter of Credit and 90% payment will be released against delivery and 10% after installation wherever the installation is being done.

13. **On-site Installation**:- The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at Institution of IIT Madras.

14. **Warranty/Guarantee**:- The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately.

15. **Late offer**:- The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal or any other delay.

16. **Acceptance and Rejection**:- I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

17. **Disputes and Jurisdiction**:- Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

18. **Acknowledgement**:- It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

SIGNATURE OF TENDERER ALONG WITH SEAL OF THE COMPANY WITH DATE.

Annexure I

Technical Specification for Modular Glove Box System Integrated with Evaporator and Spincoater and Encapsulation accessories

- The integrated Glove Box System should contain 3 main Glove Boxes (Workstation units), interconnected through valves; One for spin coater unit, one for Evaporator unit and the last one for Encapsulation unit.

Modular Glove Box 1 (Single-sided):

- The Glove Box should be made of Stainless Steel 1.4301 with dimensions of **1500 mm (Length) × 780 mm (Depth) × 900 mm (Height)**
- It is integrated with **Evaporation Chamber**
- Front window, made up of Polycarbonate with SAPHIR-coating (resistant to scratches and many chemicals) should be fixed with declination angle around 7° to avoid reflection.
- A Stand of height 1000 mm including castors and Machine feet (height adjustable) should be provided.
- 3 pieces Glove ports with diameter of 220 mm, round polymer type, including Gloves (Butyl rubber, 0.4 mm thick) should be provided.
- A florescent light with auto off should be mounted front side.
- 3 pieces Shelves (split, mounted at the backside, height adjustable) should be included.
- 2 pieces HEPA H13 dust filter inside the box for gas inlet and outlet should be provided.
- 3 pieces flanges DN40KF (Aluminium, single-sided) for installation of e.g. power feed through / media supply lines (vacuum/gases/liquids)
- A power feed through for carrying 230 V, 1 ph should be provided.

Mini Antechamber (1 No.):

- Cylindrical in shape with diameter 150 mm, length 300 mm, including sliding tray
- Type : 1/3 inside, 2/3 outside the box
- Cover : Hinged cover inside and outside
- Operation : manual, 3-way valve including sliding tray

Coating Chamber for Evaporator (1 No.):

- Dimensions inside: 500 mm (Length) × 500 mm (Depth) × 500 mm (Height)
- Substrate size up to 250 mm wafer or 175 mm × 175 mm
- Chamber with double door: Inside / outside with manual closing mechanism
- Inside : sliding door to the side
- Outside : swinging door for service / maintenance
- Material chamber body : Stainless Steel inside, protective shielding cover for easy cleaning (walls & doors)
- Front door with DN100 viewport, including viewport shutter for sight glass in front door
- **Evaporation chamber to be integrated with the PLC of gas purifier of Glove box 1**

- Visualization by separate HMI (All functions like vacuum control, source and shutter control, recipes, including graphical interface)
- Touch panel for evaporation chamber
- Touch panel for gas purifier of Glove box 1 only
- Display for evaporation control

Evaporator for thin film deposition (1 No.):

- One Vacuum measurement, consisting of PIRANI and PENNING vacuum-gauge head (metering range : atmospheric pressure to high vacuum)
- One forepump scroll pump (dry) with approximately 12 m^3/hr. throughout, oil sealed pump (option scroll pump)
- One High vacuum pump turbo molecular pump with 650 lit/sec throughput, including controller
- Obtainable ultimate vacuum : **< 9×10^{-7} mbar**

Thin Film Deposition Controller (1 No.):

- Quartz Crystal Microbalance (QCM) sensor inputs: 2 standard + 2 optional
- Frequency range : 4 to 6 MHz
- Frequency resolution : +/- 0.03 Hz @ 0.10 sec
- Frequency stability : +/- 2 ppm total, over 0 to 50° C
- Measurement/Update rate : 1 to 10 Hz
- Rate display resolution : 0.01 Angstrom/sec
- Thickness display resolution : 0.001 kAngstrom
- Processes : 100 processes, 1000 layers, 50 films,
- 4 co-deposited films
- Interfaces : RS – 232 and USB standard
- Windows software to be included

Thermal Evaporator for metal Deposition (2 Nos.):

- Single type thermal resistance evaporator with rating : 10V @ 200A = 2kVA
- Water-cooled high voltage of feed through
- One power supply for each source (transformer and thyristor controller)
- Electr. Pneumatic baffle as source shutter with height adjustable

Organic Source (2 Nos.):

- Temperature controlled for organic molecules, with shutter
- Power supply and controller for both sources (sequential evaporation)
- Volume : 2 cm^3
- Crucible : alumina
- Temperature range : 50 °C to 600 °C
- Thermocouple : Type K

Substrate Shutter (1 No.):

- Electro.-pneumatic baffle as shutter for substrate as a protection from unintended deposition of material during power up of the sources with Height adjustable facility should be provided

Substrate Holder (1 No.):

- Diameter of substrate table to be 150 mm.
- Substrate rotation should be provided with adjustable speed up to 33 rpm
- Substrate heating using quartz lamp heater with 500W lamp up to 200 °C should be provided.

Quartz Sensors for Thin Film Measurement (2 Nos.):

- Flexible positioning
- Height adjustable
- Water-cooled
- 10 pieces Spare crystals to be included

Gas Purifier 1 for Glove box 1 and Glove box 2:

- Negative and/or positive pressure operation
- Pressure control (**automatic**) : -15 to +15 mbar
- Box pressure sensor inside the box should be included
- One filter column for removal of oxygen and moisture
- Level of oxygen and moisture **<1 ppm**
- Removal Capacity: Oxygen 35 L and Moisture 1300 g
- Main valves : electro-pneumatic valves, PLC-controlled
- Piping : stainless steel, 1.4301
- Circulation blower: speed more than. 80 m^3/hour, frequency controlled
- Automatic blower speed reduction at night (programmable time)
- Vacuum pump : 17 m3/h (10 CFM) performance, oil-sealed with gas ballast and oil mist filter
- Automatic switch off capability of the vacuum pump
- Box pressure regulation in the range more than 2 mbar without the vacuum pump
- Fully automated regeneration program, with **Auto Restart** facility, PLC-controlled
- Water-proof Foot switch
- Control panel : Color touch panel
- Heat exchanger (water-cooled)

Sensor set up :

- Solid State Oxygen probe, PLC-controlled, 0-1000 ppm
- Solid State Moisture probe, PLC-controlled, 0-500 ppm

Recirculation chiller (1 No.):

- Recirculation chiller with capacity 3-5 L/min should be provided.

Modular Glove Box 2 (Single-sided):

- The Glove Box should be made of Stainless Steel 1.4301 with dimensions of **1200 mm (Length) × 780 mm (Depth) × 900 mm (Height)**
- It is integrated with **Spin Coater unit**
- Front window, made up of Polycarbonate with SAPHIR-coating (resistant to scratches and many chemicals) should be fixed with declination angle around 7° to avoid reflection.
- A Stand of height 1000 mm including castors and Machine feet (height adjustable) should be provided.
- 2 pieces Glove ports with diameter of 220 mm, round polymer type, including Gloves (Butyl rubber, 0.4 mm thick) should be provided.
- A fluorescent light with auto off should be mounted front side.
- 3 pieces Shelves (split, mounted at the backside, height adjustable) should be included.
- 2 pieces HEPA H13 dust filter inside the box for gas inlet and outlet should be provided.
- 2 pieces flanges DN40KF (Aluminium, single-sided) for installation of e.g. power feed through / media supply lines (vacuum/gases/liquids)
- A power feed through for carrying 230 V, 1 ph should be provided.

Mini Antechamber (1 No.):
- Cylindrical in shape with diameter 150 mm, length 300 mm, including sliding tray
- Type : 1/3 inside, 2/3 outside the box
- Cover : Hinged cover inside and outside
- Operation : manual, 3-way valve including sliding tray

Spin Coater (1 No.):
- Substrate size: max. 8” wafer or substrates up to 6” × 6”
- Process controller with external display
- Process bowl made of POM
- Exchangeable bowl protection inlets made of PE (3 pieces Included in delivery)
- Speed: up to 7.000 rpm (+/- 1%)
- Acceleration: 160 rpm/s^2
- Process time: up to max. 2376 sec
- Recipes: up to 10 recipes with each 10 segments
- Manual substrate loading and unloading
- Substrate fixation via vacuum and safety interlock protection
- Containment integrated in box bottom with connection to gas circulation piping
- Electrical and mechanical integration, connection to vacuum line of glove box
- Vacuum chuck of size 1” × 1” to be provided

Unit for Removal of solvent contaminations (1 No.):
- Activated Charcoal with 5 kg loading
- Operation modes :
  Inline: circulation of the atmosphere via the Unit with continuous removal
  Bypass: with manual hand valves the Unit can be removed from the circulation, e.g. during exchange of the adsorber, without breaking the circulation of the gas purifier

Modular Glove Box 3 (Single-sided):

- The Glove Box should be made of Stainless Steel 1.4301 with dimensions of **1500 mm (Length) × 780 mm (Depth) × 900 mm (Height)**
- It is integrated with **Encapsulation units**
- Front window, made up of Polycarbonate with SAPHIR-coating (resistant to scratches and many chemicals) should be fixed with declination angle around 7° to avoid reflection.
- A Stand of height 1000 mm including castors and Machine feet (height adjustable) should be provided.
- 2 pieces Glove ports with diameter of 220 mm, round polymer type, including Gloves (Butyl rubber, 0.4 mm thick) should be provided.
- A fluorescent light with auto off should be mounted front side.
- 3 pieces Shelves (split, mounted at the backside, height adjustable) should be included.
- 2 pieces HEPA H13 dust filter inside the box for gas inlet and outlet should be provided.
- 2 pieces flanges DN40KF (Aluminium, single-sided) for installation of e.g. power feed through / media supply lines (vacuum/gases/liquids)
- A power feed through for carrying 230 V, 1 ph should be provided.

Mini Antechamber (1 No.):

- Cylindrical in shape with diameter 150 mm, length 300 mm, including sliding tray
- Type : 1/3 inside, 2/3 outside the box
- Cover : Hinged cover inside and outside
- Operation : manual, 3-way valve including sliding tray

Gas Purifier 2 for Glove box 3:

- Negative and/or positive pressure operation
- Pressure control (**automatic**) : -15 to +15 mbar
- Box pressure sensor inside the box should be included
- One filter column for removal of oxygen and moisture
- Level of oxygen and moisture **<1 ppm**
- Removal Capacity: Oxygen 35 L and Moisture 1300 g
- Main valves : electro-pneumatic valves, PLC-controlled
- Piping : stainless steel, 1.4301
- Circulation blower: speed more than. 80 m^3/hour, frequency controlled
- Automatic blower speed reduction at night (programmable time)
- Vacuum pump : 17 m3/h (10 CFM) performance, oil-sealed with gas ballast and oil mist filter
- Automatic switch off capability of the vacuum pump
- Box pressure regulation in the range more than 2 mbar without the vacuum pump
- Fully automated regeneration program, with **Auto Restart** facility, PLC-controlled
- Water-proof Foot switch
- Control panel : Color touch panel
- Heat exchanger (water-cooled)

Sensor set up :

- Solid State Oxygen probe, PLC-controlled, 0-1000 ppm
- Solid State Moisture probe, PLC-controlled, 0-500 ppm

Recirculation chiller (1 No.):

- Recirculation chiller with capacity 3-5 L/min should be provided.

UV- Ozone Cleaning Unit (1 No.):

- System for UV-Ozone cleaning of semiconductor and optical surfaces
- Maximum substrate size 6"x6"
- Dimensions: 250 mm × 300 mm × 150 mm (outside dimensions)
- Lamp type: Low pressure mercury arc lamp
- Wavelength: Main peaks at 184.9 nm and 253.7 nm
- Mechanical and electrical integration into glove box

UV- curing device (1 No.):

- UV lamp with UV lamp with a maximum intensity of 140 mW/cm^2
- Lamp type: Low pressure mercury arc lamp with Fe doping
- To be mounted to a height adjustable stage,
- To be enclosed in housing with black frosted varnishing.
- Substrate size up to 80 mm × 80 mm, thickness from 0.5 to 1.1 mm
- To be installed from the ceiling of the glove box with Space saving design

Dispensing Robot (1 No.):

- Bench top, XYZ robot
- Max Dispensing area 200 mm × 200 mm
- Maximum substrate size 150 mm ×150 mm
- Repeatability +/-0.02mm/axis, Resolution:0.01mm/axis
- Data memory : 100 programs ; 4000 points/program
- Continuous path motion for perfect xyz dispensing
- Interpolates lines or arcs for 3 dimensional dispensing
- Control unit : Teach Box -LCD
- Mechanical and electrical integration into glove box
- Inert gas Pressurized dispensing system for low & Medium viscosity material
- Time controlled or manual dispensing , Timer 0.01-31 sec
- Vacuum restrain system, Dispensing pressure 0.1-7 bar

Antechambers:

T shape Ante chamber between Glove box 1 and Glove box 2:

- Diameter = 390 mm, Length = 800 mm, three vacuum doors, with swinging mechanism,
- Gas spring damping; Including sliding tray on telescopic rails

T shape Ante chamber between Glove box 2 and Glove box 3:

- Diameter = 390 mm, Length = 800 mm, three vacuum doors, with swinging mechanism,
- gas spring damping; Including sliding tray on telescopic rails

Alternate Antechamber (Optional):

- L shape Ante chamber , (300mm × 300 mm × 400 mm), sliding tray

Additional Parts:

- Extra DN 40 KF flange - 3 in each glove box
- BNC/4 pin/double sided/50 Ohm – 2 in each glove box
- BANANA/4 pin/double sided/DN40- 2 in each glove box
- Quartz window -100 mm in Glove box

Additional Requirements:

- **The integrated glove box system containing glove boxes, spin coater, evaporator and encapsulation units, should be manufactured and integrated by the single vendor.**
- **Post sale service from the single vendor**
- **Essential spares for two years**
- **There should be integrated glove box system with aforementioned specification, already installed in other lab in India, maintaining a good track of functioning.**
- **The Glove box system should be modular and upgradable.**

Annexure II

Technical Specification for Solar Cell Measurement Unit

Solar Simulator:

Solar Output:

- Class AAA should meet IEC, JIS, ASTM Class AAA specifications
- Beam size: Class AAA over entire 52 mm × 52 mm (2" × 2") area
- Rotation: 360°
- Energy level: A variable intensity ranging from **< 1 Sun** (maintaining AAA over 2" × 2" area) to **5 Sun** (maintaining AAA over more than 1/2" × 1/2" area)
- Collimated Angle: Half angle better than ± 4.0 degrees
- Spatial Uniformity: Better than ± 2% over entire 52 mm × 52 mm area (Class A)
- Spectral Match: Class A (400 – 1100 nm) and also from 350 - 1800 nm
- Temporal Stability: Better than ± 1% (Class A)

Lamp Specifications:

- Lamp Type: Xenon short arc, ozone free
- Lamp Life: ≥ 1000 hours

Power Supply Specifications:

- Source: Highly regulated DC source
- Ripple: Less than ± 0.5%
- RFI/EMI: Low; should meet stringent worldwide regulations
- Line Regulation: Less than ± 0.02%
- Current Regulation: Less than ± 0.5%
- Safety: UL 60950

Filters Specifications:

- Air Mass: Air mass 1.5 Global should be supplied with system
- Intensity should be capable to be varied from < 1 Sun to 5 Sun in a continuous manner
- Power Reduction: 80% - 120% one button control of power supply to reduce power further, continuous knob
- Wavelength Filters: Filter holder and filters should be available for spectral wavelength **from 350 nm to 1800 nm**

Shutter Control:

- Shutter Control: Digital interface for computer control

Illumination Housing:

- Black finish should be there to reduce stray light, along with integrated shutter, power supply, irradiance monitoring, temperature sensors and safety interlocks.

Power Input:

- Single Phase, 230 VAC, 10 A, 50 – 60 Hz line voltage

I-V Test Fixture:

Test Fixture:

- 52 mm × 52 mm Test Fixture with two micro-manipulators (x-y joysticks) should consist of vacuum chuck, along with a vacuum pump to hold samples down.
- The two Micro-manipulators in combination with back plate should allow 4 -Point Contact for the I-V measurements.

I-V Tester and Software:

- Electrical Interface: Both 4-Wire and 2-Wire
- I-V Test System Integration: Solar Simulator, I-V Source Meter, Accessories and I-V Software should be fully integrated to allow both manual and automatic I-V Measurements.
- Source Meter: Keithley 2400: ±1.05A at - 200V to + 200V / 20W, 100/230VAC, 50/60Hz
- Current / Voltage Accuracy 0.22% / 0.015% (Keithley)
- Measurement Time: System provides pulse duration and I-V Measurement from 5 ms to >350 ms
- Data Storage I-V Software should be able to store the data in ASCII file. SQL database.
- Computer (HP Compaq Pro 6305: Windows 7 Professional, AMD Quad-Core A8-5500B Processor, 4GB memory 500GB Storage / DVD Writer Drive or Equivalent) and Monitor (ViewSonic - 21.5" LED HD Monitor Model: VA2246M-LED or Equivalent), USB Interface

IQE/EQE Measurement System:

Solar Cell Quantum Efficiency Measurement System (QE/IPCE):

- Capable to measure absolute EQE of photovoltaic devices in power mode
- Xenon arc light source
- Dual grating monochromator
- Scanning Range: 350 nm to 1800 nm
- Spectral bandwidth < 6 nm
- Order sorting and stray light filters
- Probe light chopping frequency 1 Hz to 200 Hz
- White bias light
- Up to 5 sun irradiance (capable of varying continuously)
- Class-C match to AM1.5G
- Bias voltage up to ±3 V
- Transmission measurement capability should be there.
- Windows PC
- Able to measures IQE with imported reflectance data
- Calibration photodiode should be provided

IQE and Reflectance measurement capability:

- Minimum device size: 20 mm diameter.
- Minimum substrate size: 25 mm diameter.
- Sample Mounting:
- Clamp for smaller devices- Measures IQE with imported reflectance data
- Spectral Range: 350 nm to 1800 nm

- **There should be capability to transport the output light to different locations from the simulator (e.g. to a glove box or vacuum probe station) comfortably with uniformity over > ½" × ½" area. This is required in case the organic solar cell is sensitive atmospheric condition.**
- **There should be option to illuminate the solar cells (DUT) either from the top or from the bottom.**