

TENDER

FOR

SUPPLY & INSTALLATION OF ELLIPSOMETRY FOR VLSI

LAB IN SCHOOL OF COMPUTING & ELECTRICAL

ENGINEERING,

IIT MANDI



Tender No.: IITMANDI/Admin/PUR-143/2014-15/8182-83

Tender date: 17th March, 2015

Last Date of submission: 6th April, 2015

Indian Institute of Technology,
Mandi

Transit Campus: Mandav Hotel, 2nd Floor (Near Bus Stand), Mandi – 175001 (H.P)

Tel.: 01905-237908 **email:** satinder@iitmandi.ac.in

Indian Institute of Technology Mandi, Mandi invites tender for supply, erection, installation, commissioning, testing, demonstration and training of an **Ellipsometry**, as per specifications given in the Annexure attached to the Tender form. All offers should be made in English and should be written in both figures and words. Tender forms can be downloaded from the website (<http://iitmandi.ac.in/administration/tenderseoi.html>) of the Institute.

The bidders are requested to read the tender document carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Director, IIT Mandi, reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

Terms and Conditions:

1. The technical and financial bids should be quoted separately and put in different sealed envelopes marked "**Technical bid**" or "**Financial bid**" as applicable. These separate bids envelopes are to be put in an outer envelope which should also be sealed.
2. The Vendors who have earlier supplied the equipment to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.
3. The technical and financial bids should be submitted in original. The financial bid should include the cost of main equipment/item and its accessories. If there is any separate cost for installation etc. that should be quoted separately.
4. Each individual sealed envelope as well as the outer envelope should be marked with the following reference on the top left hand corner: "**IITMANDI/Admin/PUR-143/2014-15/_____/ Item Name.____dated 17th March, 2015**"
5. The printed literature and catalogue/brochure giving full technical details should be included with the technical bid to verify the specifications quoted in the tender. The bidders should submit copies of suitable documents in support of their reputation, credentials and past performance.
6. The rates should be quoted in figures (typed or printed) and cutting should be avoided. The final amount should be in figures as well as in words. If there are cuttings, they should be duly initialed, failing which the bids are liable to be rejected.
7. Any bids received after **01:00 P.M. on 06th April, 2015** shall not be considered
8. The Technical Bids will be opened on **06th April, 2015 at 3:00 P.M.** The date & time for opening of Financial Bids will be informed later on to the technically qualified bidders.
9. While sending rates, the firm shall give an undertaking to the effect that "*the terms/conditions mentioned in the enquiry letter/Tender Notice against which the rates are being given are acceptable to the firm.*" In case the firms do not give this undertaking, their rates will not be considered.
10. If the supplier/firm is original equipment manufacturer (OEM)/authorized dealer/sole distributor of any item, the certificate to this effect should be attached.
11. The quantity shown against the item is approximate and may vary as per demand of the Institute at the time of placing order.
12. All tender documents should have to be sent through courier, speed post or registered post only. All tender documents received after the specified date and time shall not be considered.

The postal address for submitting the tenders is:

**“Assistant Registrar, Stores and Purchase”
Indian Institute of Technology Mandi (IIT Mandi),
Administrative Block (Mandav Hotel,
Near Bus Stand), Mandi – 175001 (H.P), India”**

13. In the event of any dispute or difference(s) between the vendee Institute (IIT Mandi) and the vendor(s) arising out of non-supply of material or supplies not found according to specifications or any other cause whatsoever relating to the supply or purchase order before or after the supply has been executed, shall be referred to “The Director, IIT Mandi”, Mandi who may decide the matter himself or may appoint arbitrator(s) under the arbitration and conciliation Act,1996. The decision of the arbitrator shall be final and binding on both the parties.
14. The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.
15. All disputes shall be subject to Mandi Jurisdiction only.
16. All tenders in which any of the prescribed conditions is not fulfilled or any condition is putforth by the tenderer shall be summarily rejected.
17. The bidders or their authorized representatives may also be present during the opening of the Technical Bid, if they desire so, at their own expenses.

Note: Price bids of only those bidders will be opened whose technical bids are found suitable by the committee appointed for the purpose. Date and time of opening of price bids will be decided after technical bids have been evaluated by the committee. In exceptional situation, an authorized committee may negotiate price with the qualified bidder quoting the lowest price before awarding the contract.

18. Clarifications:

In case the bidders requires any clarification regarding the tender documents, they are requested to contact our office (e-mail: satinder@iitmandi.ac.in & arsp@iitmandi.ac.in on or **before 25/03/2015**).

19. Tender Cost:

A Demand draft of **Rs. 1,000/- (Rupees One Thousand only)** towards non-refundable **tender fee, drawn in favour of “The Registrar, IIT Mandi”** payable at Mandi should accompany the Technical bid documents. In the absence of tender cost, the tender will not be accepted.

20. Earnest Money Deposit (EMD):

A refundable amount of **4,50,000/-** as earnest money deposit (EMD) in the shape of DD from a scheduled bank in India (**valid for a minimum period of 3 months from the date of submission of tender**) should accompany the bid documents. The DD drawn in favour of “The Registrar, IIT Mandi” payable at Mandi should accompany the bid documents. The EMD should be kept in a separate sealed envelope, should be marked clearly and put in the outer envelope that contains the technical and financial bid envelopes. The bidders should enclose a pre-receipted bill for the EMD to enable us to return the EMD of unsuccessful bidders. Failure to deposit **Earnest Money in each case** will lead to rejection of tender. The bidders should submit separate EMD. In the event of the awardee bidder backing out, EMD of that bidder will be forfeited.

21. Pre – Qualification Criteria:

- a. Bidders should be the manufacturer / authorized dealer. Letter of Authorization from original equipment manufacturer (OEM) on the same and specific to the tender should be enclosed.

- b. An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.
- c. OEM should be internationally reputed Branded Company.
- d. Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder specification and supporting documents etc. may lead to rejection of the bid.
- e. The Vendors who have earlier supplied the equipment to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids
- f. **Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.**

22. Prices:

- a. The Prices quoted should be inclusive of all taxes or duties, packing, forwarding, freight, insurance, delivery and commissioning etc. at destination site (IIT Mandi, Mandi). IIT Mandi is registered with DSIR, Govt. of India and is exempted from Custom / Excise Duty. Exemption Certificate to this effect will be issued by IIT Mandi. **Hence, Customs/Excise Duty exempted price should be quoted.** The rates shall be firm and final. Nothing extra shall be paid on any account. **In the price bid/financial bid, the vendor should clearly mention the final price breakup i.e. ex-work price/FCA price, FOB price, CIP/CIF price & FOR IIT Mandi, Kamand Campus price, as applicable in their bid.**
- b. In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. For imported equipment, the Letter of Credit will be opened for the amount excluding agency commission in Indian Rupees. The firm should clearly mention the address of foreign bank in the financial bid.

23. Validity:

The bid should be valid for acceptance up to a period of 180 Days. The Bidders should be ready to extend the validity, if required without any additional financial implications.

24. Delivery:

The Equipment should be delivered and installed within the period as specified in the purchase order and be ready for use within 24 weeks of the issue of purchase order unless otherwise prescribed. If the bidder fails to deliver and place any or all the Equipments or perform the service by the specified date, penalty at the rate of 1% per week of the total order value subject to the maximum of 10% of total order value will be deducted.

25. Training:

Bidders need to provide adequate training to the nominated persons of IIT Mandi at their cost. IIT Mandi will not bear any training expenditure.

26. Warranty Declaration:

Bidders must give the comprehensive on-site warranty as required from the date of successful installation of Equipment against any manufacturing defects and also give the warranty declaration that *“everything to be supplied by us hereunder shall be free from all defects and faults in material, workmanship and shall be of the highest quality and material of the type ordered, shall be in full conformity with the specification and shall be complete enough to carry out the experiments, as specified in the tender document.*

Any deviation in the material, and the specifications from the accepted terms may liable to be rejected and the bidders need to supply all the goods in the specified form to the satisfaction / specifications specified in the order / contract and demonstrate at their own cost.

27. **Performance Bank Guarantee:** A performance bank guarantee from a scheduled bank in India for an amount equal to 10% of the price for duration of two months beyond the expiry of warranty period will be taken from the supplier or Indian agent.
28. **Terms of Payment:** Payment will generally be made only after delivery and satisfactory installation, testing, commissioning etc. **This must be specified in the tender/quotation.**
 - In case of imported supplies, payment (excluding Indian agency commission, if any) will be made through irrecoverable Letter of Credit in two installments. 80 % of the money will be released on submission of shipping of documents. Remaining 20 % will be released after successful installation of the instrument and submission of a performance bank guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the expiry of the warranty.
29. **Tender expenses and documents:** All costs incurred by the bidder in the preparation of the tender shall be at the entire expense of the bidder.
30. **Tender Evaluation Criteria:** The technical bids will be opened and evaluated by a duly constituted committee. After evaluation of the technical bid, the financial bid for only those offers which have qualified in the evaluation of technical bid will be opened.
31. The IIT Mandi reserves the right to cancel the tender at any stage (point of time) without assigning any reason.
32. **Return of EMD:**
 - The earnest money of unsuccessful bidders will be returned to them without any interest within 30 working days after awarding the contract.
 - The earnest money of the successful bidder will be returned to them without any interest within 30 Days after supply of material.
33. **Manual and documentation:** All the manuals necessary for operating and servicing the equipment (including details of electronic circuits) will have to be provided along with the instrument.
34. Bidders should go through the tender terms, conditions and specifications carefully and fill in the attached compliance statement accurately and unambiguously. They should ensure that all the required documents are furnished along with the bid.

Sd/-
Assistant Registrar
Stores & Purchase

BID PARTICULARS

- 1. Name of the Supplier :

- 2. Address of the Supplier :

- 3. Availability of demonstration of equipment : Yes / No

- 4. Tender cost enclosed: : Yes/No if yes

D.D. No. _____ Bank _____ Amount _____

- 5. EMD enclosed : Yes / No if Yes

D.D. No. _____ Bank _____

- 6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry.

Name :

Address :

Telephone No. :

Fax No. :

Mobile No :

e-Mail :

Web

Ref:-ENQUIRYNO:- **IITMANDI/Admin/PUR-143/2014-15/Ellipsometry**

Ellipsometry Specifications

VLSI Lab IIT Mandi needs a Ellipsometry for investigating the dielectric properties (complex refractive index or dielectric function, film thickness) of thin films (deposited using sputtering, ALD, PECVD, Polymer (PS, PMMA, PDMS) etc. Ellipsometry can be used to characterize band gap (in semiconductors), composition, roughness, thickness (depth), crystalline nature, doping concentration, electrical conductivity and other material properties. With add on for Surface Plasmon Resonance (SPR) imaging and sensing.

A) Basic Ellipsometry Instrument & Accessories:

- 1) **Spectral range:** from the UV to the NIR, at least between 200 nm to 1700 nm (higher preferable), sensitive to sub nano meter thickness.
- 2) **Accuracy:** better than ψ (Ψ) $\leq \pm 0.01^\circ$ and Δ (Δ) $\leq \pm 0.01^\circ$ with repeatability better than $\Psi \leq \pm 0.01^\circ$ and $\Delta \leq \pm 0.01^\circ$.
- 3) **Sample alignment resolution:** 0.001° or better in tilt axis.
- 4) **Sample holder:** capable of holding large wafers 50mm, 100mm, 150 mm (optional), to small wafer chips (~1 cm x 1 cm).
- 5) **Sample Stage:** Fully automatic X-Y stage movement with vacuum chuck $\geq 100 \times 100$ mm XY sample stage, height and tilt adjustment.
- 6) **Temperature controlled stage:** from room temperature ($- 50$ °C optional) to 600°C (higher preferable) enabling sample characterization at a range of temperatures for the investigation of new material properties (thermal transition analysis for polymers, band structure for compound alloys). Designed such a way so as to make instrument independent of temperature variations.
- 7) **Lamp Life:** ≥ 1000 hours.
- 8) **Source:** Computer controlled dual source of light consisting of a Deuterium light source OR Equivalent for the UV, Halogen Tungsten light source OR Equivalent for the VIS. NIR: Halogen lamp OR equivalent OR other equivalent source/sources for given spectral range. Spectral resolution equivalent/better than 1nm for entire spectral range.
- 9) **Measurement Spot:** Manually variable beam diameter ≤ 4 mm with option for 200 μm (or better) spot.
- 10) **Goniometer:** Automatic/manual Goniometer with variable tuning from 40° (or less) to 90° (or more) by step of 5° with an accuracy of $\pm 0.01^\circ$.
- 11) **Angle of incidence:** from 40° to 90° by step of 5° with an accuracy of $\pm 0.01^\circ$ (or better).
- 12) **Measurable Parameters:** Capable of measuring refractive index, reflectance, reflection intensity (% reflection), absorption and film thickness, accurate measurements of transparent films on transparent substrates, depolarization (%depolarization), uniformity of films, transmittance (% transmission) at different wavelengths and angle of incidence.
- 13) **Thickness measurement range:** Capable of measuring film thickness ranging atomically thin layers (0.2 nm or less) to $>100 \mu\text{m}$ (± 0.1 nm) with 1-6 (or better) layers on substrates like Si, GaAs, Ge, polystyrene, PMA, PDMS etc. of varying thickness, with measurement time ≤ 10 sec.
- 14) **Sensitivity:** High sensitivity typically equivalent to an ellipticity of about 10^{-6} , or a polarisation angle of 10^{-3} degrees.
- 15) **Telescope:** Auto collimating telescope (ACT) for tilt and height adjustment with auto focus feature.

- 16) **Imaging:** Video camera option for ACT, it also gives a picture of the measurement area on the PC monitor. Standard camera monochrome GigE CCD camera with variable exposure time and gain control $\geq 1080 \times 720$ pixel, ≥ 12 bits, max ≥ 30 frames per second with 10, 20 and 50 x objectives. Allowing real time images at variable angle of incidence ($< 70^\circ$).
- 17) **Spectroscopic Measurements:** Automatic setting up of optical components and spectral display in standard energy (cm^{-1} , eV) and wavelength (**A**, nm) units for spectroscopic measurements.
- 18) **Power requirement:** should be maintained at 230 VAC single phase or 440 V three phase, 50 Hz.
- 19) **Fitting options:** Fast regressive fitting approach/algorithm with option for Fit error, correlation matrix calculation with simultaneous graphical display of experimental and calculated data.

B) Computers & Software:

- 1) Computer system (I7, minimum 8 GB RAM, 1 TB hard disk, 24" LED screen with genuine windows 7 OS) with image analysis software [with pre defined libraries/models recipes for ease of use with wide material based on dispersion relations such as SiO_2 , Si_3N_4 , TiO_2 , ZrO_2 , HfO_2 , Al_2O_3 , ZrO_2 , Er_2O_3 , SiO_xN_y , GeO_2 , GeO_x , etc. 2D materials (Graphene, MoS_2 , WS_2 , Boron nitride), organic dielectrics, polymers (PDMS, PVP, etc), photoresists, on Si/GaAs/Ge substrates].
- 2) The system must have the ability to be controlled remotely via an internal network along with the facility to connect with internet and to troubleshoot remotely.
- 3) Software should also be capable of analysis of ellipsometric, transmission and reflection data, database and list of bibliographic reference extendable by user, data and graphs easily transferred to Windows applications, Import/export package functions for high flexibility in file manipulation, Advanced mathematical fitting algorithms.

C) Surface Plasmon Resonance (SPR) add on of Sensing and Imaging:

- 1) Angle scan measurement method (sensing) and Intensity interrogation (imaging) with 2-3 channels for sample flow and array sensing point.
- 2) LED of wavelength (sensing) 780 nm and wavelength (imaging) 760 nm as a light source with dove prism for micro fluidic flow cell with 2D CMOS detector (better preferable).
- 3) Sensing prism material BK7.
- 4) Imaging prism material BK & LaF2 or user modified.
- 5) Sample injection volume in the range of 2-7 μl (better preferable).
- 6) Data processing via software USB port.
- 7) Detector 2D Charge Peltier Cooled Coupled Device (CCD).

D) Optional Items for Ellipsometry

- 1) Electrochemical cell for the study of electrochemical processes using ellipsometer.
- 2) Laser Driven Lamp source with high lifetime $\geq 10,000$ hours.
- 3) Non contact sheet resistance tester.

General Requirement :

i) Warranty and maintenance

- a. The complete instrument should be under warranty at least for a period of **one year** from the date of installation. Additional cost, if any for extended warranty of three years may be quoted.

- b. In case of breakdown during the warranty period, a competent service engineer of the supplier should make as many visits as are necessary to rectify the problem and replace the faulty parts, without any liability of cost. But it should be repaired within 72 working hours from the date and time of complaint lodged by the user. In case of any delay in repair without adequate justification, there will be penalty of rupees 5,000/- per day for the down time. Supplier should ensure to provide all spares required for making the instrument operational.

ii) Annual maintenance contract

Quote the cost of onsite annual maintenance for two years after warranty period.

iii) Installation and training

Installation should be done by the manufacturer. On-site one week training for operation and application may be given to the users free of cost. IIT Mandi will not bear any training or leaving expenditure in this regard.

iv) Manual

One set of operating manual and service manual including detailed drawings and circuit diagrams (in English) should be provided with the instrument.

v) User list with contacts

Vendor should provide us a list of installations in India with all contact details and model details so that IIT Mandi can approach the contact person for any feedback. In case of any doubt about capability of the machine, the vendor will have to arrange demonstration at any site bearing the cost including the travel and other expenses of IIT Mandi representative.

(vi) Safety devices: Suitable UPS systems to run the system safely at least for 1 hrs.

(vii) Quote all necessary items for installation of this instrument.

**COMPLIANCE STATEMENT FOR THE TENDER
SPECIFICATIONS**

**INDIAN INSTITUTE OF TECHNOLOGY MANDI
HIMACHAL PRADESH-175001**

Ref:-ENQUIRY NO:- **IITMANDI/Admin/PUR-143/2014-15/Ellipsometry**

Instructions

1. You have to fill in all columns and ensure that you furnish all the required information accurately and unambiguously.
2. If our specification contains any values, you have to provide your values against the column in the same unit as we have specified.
3. Deviation in values, materials etc. from our specification may be explained in the remarks column

S. NO	Check list of documents/ Undertakings ?	YES/NO	Remarks (Give explanation if answer is No)
1	Is Tender fees attached?		
2	Is EMD attached? (if applicable)		
3	Is the bidder original equipment manufacturer (OEM)/authorised dealer?		
4	If authorised dealer, recent dated certificate to this effect from OEM, attached or not?		
5	Undertaking from OEM regarding technical support & extended warranty period		
6	Validity of 180 days or not?		
7	Undertaking from bidder regarding acceptance of tender terms & conditions		
8	Whether list of reputed users (along with telephone numbers of contact persons) for the past three years specific to the instrument attached.		
9	Whether special educational discount for Indian Institute of Technology (IIT) Mandi (H.P) given.		
10	Whether One weeks training of operator and research students without any charges offered.		
11	Does the instrument complies with all the specifications from S. no. A to D. Attach a separate sheet showing compliance with the specifications and explanations thereto if the equipments varies from the requested specifications.		
12	Whether free Installation, Commissioning and Application Training offered.		
13	Whether required comprehensive onsite extended warranty offered.		
14	Whether Annual maintenance after expiry of comprehensive onsite warranty quoted separately as optional.		