

**TENDER (E - PROCUREMENT MODE)**

**FOR**

**SUPPLY & INSTALLATION OF IMAGING ELLIPSOMETRY IN SCHOOL OF  
COMPUTING & ELECTRICAL ENGINEERING AT IIT MANDI**



**Tender No.: IITMANDI/S&P/PUR- 86/2016-17/504243**

**Tender date: 24<sup>th</sup> August, 2016**

**Last Date of submission: 14<sup>th</sup> September, 2016**

Indian Institute of Technology Mandi

IIT Mandi, Administrative Block at Bamboo Hut, Near Director Office,

Kamand - 175005

Ph. No.: 01905-267134 email: [arsp@iitmandi.ac.in](mailto:arsp@iitmandi.ac.in) & [satinder@iitmandi.ac.in](mailto:satinder@iitmandi.ac.in)

Indian Institute of Technology Mandi, Kamand invites online Bids for supply, erection, installation, commissioning, testing, demonstration and training of **Imaging 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 CPP Portal (<http://eprocure.gov.in/eprocure/app>)

& Institute website <http://iitmandi.ac.in/administration/tenderseoi.php>.

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, Kamand 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.

#### **Preparation and submission of bids:**

1. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender publishing on the CPP Portal.
2. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
3. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
4. The tenders will be received online through portal <http://eprocure.gov.in/eprocure/app>. In the Technical Bids, the bidders are required to upload all the documents in .pdf format. All quotation (**both Technical and Financial should be submitted in the E-procurement portal**).
5. Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through <http://eprocure.gov.in/eprocure/app>. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site <https://eprocure.gov.in/eprocure/app> under the link “Information about DSC”.
6. Technical & Financial Bids should be submitted in PDF format.
7. **In case of Financial bids**, a standard BOQ format has been provided in PDF format. Bidders are required to download the BoQ PDF file and fill their financial

- offer on the same BOQ format. After filling the same, submit it online in PDF format, without changing the financial template format. If the BoQ format file is found to be modified by the bidder, the bid will be rejected.
8. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF formats. Bid documents may be scanned with 100 dpi with black and white option.
  9. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
  10. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
  11. **Kindly add scanned PDF of all relevant documents in a single PDF file like, compliance sheet, OEM/Principle Certificate etc.**
  12. Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
  13. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
  14. 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.
  15. The technical and financial bids should be submitted online through portal <http://eprocure.gov.in/eprocure/app> 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.
  16. Each bidder should be marked with the following reference on the top bids submitted online: **“IITMANDI/S&P/PUR-86/2016-17/5042-43/Item Name. dated 24<sup>th</sup> August, 2016”**.
  17. 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 in .pdf format.
  18. 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.
  19. **Assistant To Bidders:** Any queries relating to the tender document and the terms & conditions contained therein should be addressed to tender Inviting Authority for a tender or relevant contact person indicated in the tender.

20. Any bids received after **1:00 P.M. on 14<sup>th</sup> September, 2016** shall not be considered
21. The Technical Bids will be opened on **14<sup>th</sup> September, 2016 at 03:00 P.M.** The date & time for opening of Financial Bids will be informed later on to the technically qualified bidders.
22. 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 .pdf format. In case the firms do not give this undertaking, their rates will not be considered.
23. If the supplier/firm is original equipment manufacturer (OEM)/authorized dealer/sole distributor of any item, the certificate to this effect should submit in .pdf format.
24. The quantity shown against the item is approximate and may vary as per demand of the Institute at the time of placing order.
25. The tenders will be received online through portal <http://eprocure.gov.in/eprocure/app>. All tender documents received after the specified date and time shall not be considered.

For any correspondence regarding tenders is on below address:

**“Assistant Registrar, Stores and Purchase”  
Indian Institute of Technology Mandi (IIT Mandi),  
Near Director Office, Kamand Distt. Mandi – 175005 (H.P), India”**

26. 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”, Kamand 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.
27. The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.
28. All disputes shall be subject to Mandi Jurisdiction only.
29. All tenders in which any of the prescribed conditions is not fulfilled or any condition is put forth by the tenderer shall be summarily rejected.
30. All items listed below may not be necessarily ordered and the quantities mentioned in the tender document are also approximate. Items and their numbers to be ordered will be decided by the committee later at the time of ordering. Hence, **the vendor should quote for unit item /smallest pack available for all items”**

31. 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. Information in this regard will be intimated only to the technically qualified bidders. In exceptional situation, an authorized committee may negotiate price with the qualified bidder quoting the lowest price before awarding the contract.

### 32. Clarifications:

In case the bidders requires any clarification regarding the tender document, they are requested to submit their queries on the e-mail i.e [satinder@iitmandi.ac.in](mailto:satinder@iitmandi.ac.in) & [arsp@iitmandi.ac.in](mailto:arsp@iitmandi.ac.in) on or **before 09/09/2016**.

### 33. Tender Cost:

The bidder should submit 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 in a sealed envelope super-scribed as **“Tender fee & NIT No. IITMANDI/S&P/PUR-86/2016-17/5042-43/Item Name. dated 24<sup>th</sup> August, 2016”** on or before last date & time of submission of bids. In the absence of tender cost, the tender will not be accepted.

### 34. Earnest Money Deposit (EMD):

Bidder should furnish an EMD of a refundable amount of **Rs 5,00,000/-** in the shape of DD from a scheduled bank in India drawn in favour of **“The Registrar, IIT Mandi” payable at Mandi**. This EMD should be submitted in sealed envelop super-scribed as EMD & NIT No. **“IITMANDI/S&P/PUR-86/2016-17/5042-43/Item Name. dated 24<sup>th</sup> August, 2016”**. 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 will lead to rejection of tender**. In the event of the awardee bidder backing out, EMD of that bidder will be forfeited.

➤ **Note: Both (tender fee & EMD) envelops should be placed in another sealed envelope and address to:**

**“Assistant Registrar, Stores and Purchase”  
Indian Institute of Technology Mandi (IIT Mandi),  
Near Director Office, Kamand Distt. Mandil – 175005 (H.P), India”**

**This envelop having tender fee & EMD should reach on or before last date & time of submission of bid.**

### 35. EMD Exemption:

The Institute may accept bids without EMD from those bidders who are registered with the Central Purchase Organization, National Small Industries

Corporation (NSIC) or the concern Ministry or Department **as Manufacturer**. To claim the exemption, the bidder must be offering goods manufactured by themselves. Exemption will not be granted in case the bidder is acting as an agent for some other vendor.

### 36. Pre – Qualification Criteria:

- 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.
- 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.
- 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.
- OEM should be internationally reputed Branded Company.
- 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.
- **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.**

### 37. Prices:

- 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/Kamand). 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 case of imports/foreign supplier, the price should be quoted on ex-work price/FOB/FCA basis only. Under special circumstance (e.g. perishable chemicals), when the item is imported on CIP/CIF, please indicate CIF/CIP charges separately upto Delhi indicating the mode of shipment. IIT Mandi will make necessary arrangements for the clearance of imported goods at the Airport/Seaport.**
- In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. **IAC shall be paid after satisfactory installation & commissioning of the goods at the destination.** 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.

- **In case of indigenous item, the vendor should clearly mention the final FOR IIT Mandi, Kamand Campus Price, as applicable in their bid.**

**38. 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.

**39. 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.

**40. Installation, Training & Demonstration:**

Bidders need to provide adequate training to the nominated persons of IIT Mandi at their cost. IIT Mandi will not bear any training expenditure. The supplier is required to done the installation and demonstration of the equipment within **one month** of arrival of materials at the IIT Mandi site of installation, otherwise the penalty clause will be the same as per the supply of material.

**41. 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.

- 42. 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.

- 43. 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 irrevocable 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. All the bank charges within India will be borne by the Institute and outside India will be borne by the Supplier.
  - In case of required item quoted in INR, 80% payment will be made through E-payment after receipt of material in good condition and Remaining 20% will be released on successful installation of the instrument and on 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.
44. **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.
45. **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.
46. **Return of EMD:**
- The earnest money of unsuccessful bidders will be returned to them without any interest within 15 working days after awarding the contract.
  - The earnest money of the successful bidder will be returned to them without any interest within 15 Days after supply of material.
47. **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.
48. The IIT Mandi reserves the right to cancel the tender at any stage (point of time) without assigning any reason.
49. 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/S&P/PUR-86/2016-17/IMAGING ELLIPSOMETRY**

VLSI Lab IIT Mandi is looking for a complete stand alone Spectroscopic Imaging Ellipsometer preferably integrated with Brewster Angle Measurement 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. Detailed specifications and requirement are as following

**A) Basic Ellipsometry Instrument & Accessories:**

- 1) **Spectral range:** from the UV to the NIR, at least between 250 nm to 1700 nm (higher preferable), sensitive to sub nano meter thickness.
- 2) **Source:** Computer controlled dual source of light consisting of a Broadband diode laser @ 658 nm, 50 m OR W and Xenon light source for given spectral range of 250 -1700 nm. Spectral resolution equivalent/better than 1nm for entire spectral range.
- 3) **Beam Diameter:** Should be less than 1.5 mm and achieve lateral resolution of 0.6  $\mu\text{m}$  or better in entire spectral range.
- 4) **Lamp Life:**  $\geq 10000$  hours.
- 5) **Detector/ Camera:** CCD Camera having Si CCD array / InGaAs photodiode array.
- 6) **Goniometer for Angle of Incidence:** High precision automatic software controlled goniometer to enable variable angle measurements from  $40^\circ$  to  $90^\circ$  by step of  $2^\circ$  or less with an accuracy of  $\pm 0.001^\circ$ .
- 7) **Polarizer & Analyzer:** Automatic computer controlled movement.
- 8) **Accuracy:** better than  $\psi$  ( $\Psi$ )  $\leq \pm 0.01^\circ$  and  $\Delta \leq \pm 0.01^\circ$  with repeatability better than  $\Psi \leq \pm 0.01^\circ$  and  $\Delta \leq \pm 0.01^\circ$ .
- 9) **Sample alignment resolution:**  $0.001^\circ$  or better in tilt axis.
- 10) **Sample holder:** capable of holding large wafers 50mm, 100mm, 150 mm to small wafer chips (~1 cm x 1 cm).
- 11) **Sample Stage:** Fully automatic X-Y stage movement  $\geq 100 \times 100$  mm XY sample stage, automatic height and tilt adjustment. Automatic sample rotation.
- 12) **Temperature controlled stage:** from  $-50^\circ\text{C}$  to  $600^\circ\text{C}$  (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).

- 13) **Liquid Cell:** At least 20 ml liquid cell for 50°-70° incidence angle. Can be heated upto 70°C.
- 14) **Transmission Mount:** To hold specimen having size 20mm to 150mm
- 15) **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.
- 16) **Thickness measurement range:** Capable of measuring film thickness ranging atomically thin layers to  $>20\mu\text{m}$  ( $\pm 0.1$  nm) with 1-6 (or more) layers on substrates like Si, GaAs, Ge, Polystyrene, PMA, PDMS etc. of varying thickness, with measurement time  $\leq 10$  sec.
- 17) **Sensitivity:** High sensitivity typically equivalent to an ellipticity of about  $10^{-6}$ , or a polarisation angle of  $10^{-3}$  degrees.
- 18) **Telescope:** Auto collimating telescope (ACT) for tilt and height adjustment with auto focus feature.
- 19) **Imaging:** Video camera option for ACT, should give a picture of the measurement area on the PC monitor. Standard camera monochrome CCD camera with variable exposure time and gain control  $\geq 1080 \times 720$  pixel,  $\geq 12$  bits, max  $\geq 40$  frames per second with 10, 20 and 50x objectives. Allowing real time images at variable angle of incidence upto at least 70°.
- 20) **Spectroscopic Measurements:** Automatic setting up of optical components and spectral display in standard energy ( $\text{cm}^{-1}$ , eV) and wavelength ( $\text{\AA}$ , nm) units for spectroscopic measurements.
- 21) **Power requirement:** should be maintained at 230 VAC single phase or 440 V three phase, 50 Hz.
- 22) **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, up to date with latest genuine windows and with image analysis software [with predefined libraries/models recipes for ease of use with wide material based on dispersion relations such as  $\text{SiO}_2$ ,  $\text{Si}_3\text{N}_4$ ,  $\text{TiO}_2$ ,  $\text{ZrO}_2$ ,  $\text{HfO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{Er}_2\text{O}_3$ ,  $\text{SiO}_x\text{N}_y$ ,  $\text{GeO}_2$ ,  $\text{GeO}_x$ , etc. 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) cell for Sensing and Imaging SPR signals:**

Kinetic SPR cell in a Kretschmann setup as an in situ cell for imaging SPR experiments.

Specifications of the cell: for SPR slides, OptiSlides standard microscope slides, volume: 0.1 ml, observable area: 4 x 8 mm, field of view (included 2x objective): 2 x 3 mm, material: PEEK (cell and tubing) and Viton (O-Rings).

**D) Brewster Angle Microscopy (BAM):** Complete system which can be integrated with the basic ellipsometer unit. Single software should be used for acquiring and analyzing both ellipsometric and BAM data.

**E) Active vibration isolation should be included.**

**F) Optional Items & Accessories:**

1. Electro Chemical Cell: Electro Chemical Upgrade for Kinetic ~~+~~ SPR cell (C)
2. Mueller Matrix upgrade

**G) Other Requirement : Following should be included with the offer without any additional cost**

- (i) The vendor should depute a trained person, having scientific background, at IIT Mandi to operate the system for two years. The person should be deputed with consultation of IIT Mandi authorities.
- (ii) Standard samples for calibrating the system
- (iii) Tool kit containing all the required tool.
- (iv) Hard copies of operational manuals for all the items.
- (v) The supplier should provide one week training to the students and other users at the time of installation and thereafter **3 days advance training** atleast 4 times in next 2 years, as and when required by IIT Mandi
- (vi) There should be atleast 5 system of similar specifications installed in India. Provide list of users with their contact details and year of installation
- (vii) Warranty- Two years**
- (viii) Provide the AMC charges after expiry of two year warranty.**
- (ix) A compliance statement in the attached format should be submitted with the offer. Any deviation from the specified specification should be marked clearly in the compliance sheet.

**COMPLIANCE STATEMENT FOR THE TENDER SPECIFICATIONS**

**INDIAN INSTITUTE OF TECHNOLOGY MANDI**

**HIMACHAL PRADESH-175001**

**Ref:- ENQUIRYNO:- IITMANDI/S&P/PUR-86/2016-17/IMAGING ELLIPSOMETRY**

<b>Compliance Statement</b>			
<b>Sr. No.</b>	<b>Specification</b>	<b>Details</b>	<b>Response (Complied /Not Complied)</b>  <b>Kindly provide reference of brochure or website. Also provide hard copy of the reference. Any deviation should be clearly marked.</b>
1.	<b>Spectral range</b>	At least between 250 nm to 1700 nm (higher preferable)	
2.	<b>Light Source</b>	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  Broadband diode laser @ 658 nm, 50 mW for given spectral range of 250 -1700 nm.  -Spectral resolution equivalent/better than 1nm for entire spectral range.	
	<b>Beam Diameter:</b>	Should be less than 1.5 mm to achieve lateral resolution of 0.6 microns or better in entire spectral range	
	<b>Lamp Life:</b>	≥ 1000 hours.	
	<b>Detector/ Camera:</b>	CCD Camera having Si CCD array / InGaAs photodiode array.  Kindly provide pixel details here	
	<b>Goniometer for Angle of Incidence</b>	software controlled goniometer to enable variable angle measurements from 40° to 90° by step of 1° or less with an accuracy of ± 0.001°.  Speed of motion: ~ 5° / sec. or better)	

<b>Polarizer &amp; Analyzer</b>	Automatic software controlled movement.	
<b>Accuracy</b>	better than psi ( $\Psi$ ) $\leq \pm 0.01^\circ$ and delta ( $\Delta$ ) $\leq \pm 0.01^\circ$ with repeatability better than $\Psi \leq \pm 0.01^\circ$ and $\Delta \leq \pm 0.01^\circ$ .	
<b>Sample alignment resolution</b>	0.001° or better in tilt axis	
<b>Sample holder</b>	Can hold large wafers 50mm, 100mm, 150 mm to small wafer chips (~1 cm x 1 cm).	
<b>Sample Stage</b>	Fully automatic X-Y stage movement with vacuum chuck $\geq 100 \times 100$ mm XY sample stage, automatic height and tilt adjustment and automatic sample rotation.	
Temperature controlled stage	temperature $-50^\circ\text{C}$ to $600^\circ\text{C}$ (higher preferable)	
<b>Liquid Cell</b>	Atleast 20 ml liquid cell for $50^\circ$ - $70^\circ$ incidence angle.  Can be heated upto $70^\circ\text{C}$ .	
<b>Transmission Mount</b>	To hold specimen having size 20mm to 150mm	
<b>Measurable Parameters</b>	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.	
<b>Thickness measurement range</b>	Capable of measuring film thickness ranging atomically thin layers to $>100 \mu\text{m}$ ( $\pm 0.1 \text{ nm}$ ) with 1-6 (or more) layers on substrates like Si, GaAs, Ge, polystyreen, PMA, PDMS etc. of varying thickness, with measurement time $\leq 10 \text{ sec}$ .	
<b>Sensitivity</b>	High sensitivity typically equivalent to an ellipticity of about $10^{-6}$ , or a polarisation angle of $10^{-3}$ degrees.	
<b>Telescope</b>	Auto collimating telescope (ACT) for tilt and height adjustment with auto focus feature.	
<b>Imaging</b>	Should capture image of the measurement area on the PC monitor. Standard camera monochrome CCD camera with variable exposure time and gain control $\geq 1080 \times 720$ pixel, $\geq 12$ bits, max $\geq 40$ frames per second with 5x, 20x and 50x objectives.	

		Allowing real time images at variable angle of incidence ( $< 70^\circ$ ).	
	<b>Spectroscopic Measurements</b>	Automatic setting up of optical components and spectral display in standard energy ( $\text{cm}^{-1}$ , eV) and wavelength (, nm) units for spectroscopic measurements.	
	<b>Fitting options</b>	Fast regressive fitting approach/algorithm with option for Fit error, correlation matrix calculation with simultaneous graphical display of experimental and calculated data.	
	<b>Data Acquisition, Calibration and Analysis software</b>	Ellipsometric data should be acquired automatically by the software in the whole spectral range at any number of specified angles.	
		Software should calculate automatically the ellipsometric constants in reflection and transmission for single and multi layered film structures	
		Software should be able to calculate the thickness of each thin film in multilayer structure precisely	
		Should contain a library of dispersion models suitable for all type of specimens.  Should have huge library of materials data, more than 150	
	Upgradation of Software	Should be free upgradable for the life of the system	
	<b>Surface Plasmon Resonance (SPR)</b>	Kinetic SPR cell in a Kretschmann setup as an in situ cell for imaging SPR experiments.  Specifications of the cell: for SPR slides, OptiSlidesos standard microscope slides, volume: 0.1 ml, observable area: 4 x 8 mm, field of view (included 2x objective): 2 x 3 mm, material: PEEK (cell and tubing) and Viton (O-Rings)	
	<b>Brewster Angle Microscopy (BAM):</b>	BAM should be integrated with the basic ellipsometer hardware and software	

<b>Optional Accessories</b>		
Electro Chemical Cell:		
Mueller Matrix upgrade		
<b>Others</b>		
Training	One week training to the students and other users at the time of installation and thereafter 3 days advance training atleast 4 times in next 2 years, as and when required.	
Installations	There should be atleast 5 system of similar specifications installed in India. Provide list of users with their contact details and year of installation	
<b>Warranty</b>	<b>Two years</b> comprehensive	
AMC	Provide the AMC charges after expiry of two years warranty	