


	<b>INDIAN INSTITUTE OF TECHNOLOGY MADRAS</b> <b>Chennai 600 036</b>  Telephone: [044] 2257 9798/9723      FAX: [044] 2257 4855 E-mail: <a href="mailto:arpp@iitm.ac.in">arpp@iitm.ac.in</a>	
---	---	---

V. Sathyanarayanan  
Senior Manager (Project Purchase)

Ref: **PHY/JKRA/010/2018**  
Date: 05.11.2018

**Open Tender No: PHY/JKRA/010/2018**

**Due Date: 26<sup>th</sup> November 2018, 3pm**

**Pre-Bid meeting: - Not required.**

**Technical Bid opening meeting on 26<sup>th</sup> November 2018, 4:30 PM at Department of Physics, IIT-Madras.**

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“Screen Printer for Solar Cell Application”** conforming to the specifications given in Annexure I.

Vendor who can supply and integrate the above equipment alone need to respond to the tender please.

**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 addresses mentioned below, 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:  
  
**Senior Manager,  
Project Purchase,  
IC & SR Building 2<sup>nd</sup> 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 will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of the technical bids. With respect to opening the financial bid, only technically qualified bidders will be called.
- IV. **Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to the **Department of Physics**. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. Kindly note that IIT Madras is eligible for concessional GST and relevant certificate will be issued.

In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP basis indicating the mode of shipment.

- V. Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document 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 the percentage of payment and it should be included in the basic price quoted originally (if any)..
- VI. Terms of Delivery:** - The item should be supplied to the **Department of Physics, IIT Madras** as per the 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. Technical Bid Opening:** The technical bid will be on 26<sup>th</sup> November 2018, 4:30 PM at the **Department of Physics, IIT-Madras**. The financial bids of those tenders who are technically qualified will be opened at a later date under intimation to them.
- VIII. IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

**V. Sathyanarayanan**  
**Senior Manager (Project Purchase)**  
**IC&SR Building, I.I.T. Madras,**  
**Chennai - 600 036.**

## SCHEDULE

### Important Conditions of the tender

1. The due date for the submission of the tender is **26.11.2018, 2 pm.**

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, pricing 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 Open Tender for supply of **“Screen Printer for Solar Cell Application”** should be written on the left side of the Outer bigger cover and sealed.

2. **EMD: - The EMD in the form of account payee DD for 2% value of the item in favor of Registrar IIT Madras should be enclosed in the cover containing financial bid.** Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.

The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

***When no local agent, the foreign vendor can submit demand draft equal to 2% or wire transfer the amount to our account as detailed in the attachment (Annexure II) and enclose the proof with the financial bid.***

3. **Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank in India. **The performance security should be furnished within 21 days from the delivery of the purchase order.**

**Performance Security in the form of Bank Guarantee:-** In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.

The Bank Guarantee 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. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:  
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.
  - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
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. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
8. **Validity:** Validity of Quotation not less than 90 days from the due date of tender.
9. **Delivery Schedule:** - The tenderer should indicate clearly the time required for delivery of the item (subjected to the executive committee-IITMadras approval). 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.  
If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IITM, the PO would be cancelled and liquidated damages will be enforced.
10. **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.
11. **Payment:-**
  - (i) No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
  - (ii) **Advance Payment:** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
12. **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 site of IIT Madras.
13. **Warranty/Guarantee:** - As per the tender specification.
14. **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, Courier or any other delay.
15. **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.
16. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

**17. Disputes and Jurisdiction:**

**Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration

and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

- a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. 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.

20. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

**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**

<b>Tender SPECIFICATIONS FOR SCREEN PRINTER FOR SOLAR CELL APPLICATION.</b>
---

**Application :** Screen Printer is required for printing Ag paste (200 nm thick) at low temperature (<150C) on to solar cells, as Ag metal gridlines.

System will be used for printing narrow grids lines of high aspect ratio on silicon heterojunction solar cells of 4" to 6" wafers. It should be possible to make grids also on small solar cells of  $\leq 1\text{cm}^2$  area

SN.	PARAMETER	SPECIFICATION REQUIRED
1	Substrate size to be handled	a Max. Substrate size of 500 mm X 500 mm
		b Min. Substrate size of 50 mm X 50 mm
		c Substrate Thickness : 0.2 mm to 5.0 mm
		d Max. Substrate weight should be more than 1kg and Heavy Substrate handling is required for carrying the Substrate Pallet /Carrier
2	Substrate Transport	a ESD compatible Belt conveyors with automatic width adjustment.
		b Auto Substrate loading
		c Substrate Underside Clearance : Programmable 3mm to 42mm
3	Transport direction	Should support Left to Right, Right to Left
4	PCB clamping & Support /Tooling	a Soft rail lift/land & Board clamp regulator
		b Vacuum tooling to be supplied
		c Adjustable Bottom side supports like magnetic pins (Min. 20pins req.) and Universal Substrate Pallet / carrier to be supplied.
5	Stencil Positioning	a Center, Front Justified and Rear Justified

		b	Stencil handling capability of 736mm x 736mm (29" x 29") and shall have the capability to fully adjustable to accommodate frame sizes in the range of 381mm to 736mm (15" to 29") by 38mm height. Image position: Centre/Front/Customor
		c	Semi-Auto- Stencil Load incorporating squeegee drip tray
6	Substrate Warpage		Up to 7mm including substrate thickness
7	PCB registration & alignment	a	Through automatic camera vision for each PCB, using 2-3 fiducials of any shape. Teaching of fiducials to be possible. fiducials within 3mm from the edges to be recognized.
		b	Contrast and brightness adjustment for reading inconsistent fiducials required.
		c	Should have a Synthetic fiducial library or unique pattern recognition
		d	Vision Field of View 10.0 mm x 8.0 mm
		e	Should be with a Software controlled programmable LED lighting
		f	Single camera for both vision alignment of stencil and board required
		g	Machine should be able to recognize local fiducials for alignment of components if given.
8	Substrate loading/alignment/unloading time		Should be ≤ 8 seconds
9	Stencil/Screen size to be handled		Stencil handling capability of 736mm x 736mm (29" x 29") and shall have the capability to fully adjustable to accommodate frame sizes in the range of 381mm to 736mm (15" to 29") by 38mm height. Image position: Centre/Front/Customor
10	Print Area		500 mm X 500 mm
11	Machine alignment capability		> 2.0 Cmk @ +/- 12.5µm, (±6 Sigma)
12	System Alignment Capability		> 2.0 Cmk @ +/- 20µm, (±6 Sigma)
13	Wet Print Capability		> 2.0 Cpk @ +/- 25µm, (±6 Sigma)
14	Printing speed		200 mm/s (12.0"/sec)

15	Printing head		Independent direct motor driven lead screw/Pneumatic Head type for both front and rear squeegee heads required
			Force applied using motor / Air pressure
			Programmable squeegee head should be standard with machine
16	Snap off Speed		Should be programmable
17	Snap off Distance		0 - 4mm
18	Printing Force		1 - 20kg
19	print stroke		Should be programmable
20	Underside stencil wiping	a	Dry bottom clean, Wet bottom clean, Vacuum aperture clean Programmable
		b	Wipe Stroke should be full print area
21	Temperature/Humidity Sensor		Monitoring of the process environment
22	System Control/Operations		Completely Automatic, Computer controlled Inline operations required.
23	Software Support	a	User friendly software
		b	On line Programming
		c	Interactive fiducial data creation
		d	Extensive fiducial data base
		e	Operator information system for complying online production data & error data.
		f	Graphical User Interface.
		g	Wizard based programming option required for software
		h	Step by step guides and templates to facilitate rapid set-up and changeover
24	Power Supply		200 - 240VAC 50Hz 15A
25	Power Consumption		Should be below 3.5KW



26	Air Supply	Should ≤ 100 psi
27	Air Consumption	Specify as per requirement
28	Foot print and weight	Length, width, height and weight to be indicated.
29	Installation & commissioning	To be done at free of cost
30	Warranty	Minimum of 12 months from date of successful commissioning
31	Process engineering support	Process/Production engineering support to be provided at least during warranty period
32	Safety Compliance	As per CE standards
33	Accessories, Tools, Calibration and Preventive maintenance kits	To be supplied with the machine
34	Screen Supply	Screen for one application to be supplied with the Machine
35	User Interface language	<b>In ENGLISH</b>
36	Manuals	a 3 sets of Operation/Programming/Maintenance manuals to be provided.
		b Maintenance manual should cover trouble shooting procedures error codes and basic servicing
		c Basic Spares kit to be supplied with the machine
		c spare parts prone to wear & tear should be stocked in India.
		d Spare parts to be supplied free of cost during warranty
		e Availability of spare parts to be ensured for five years
37	Service support	a Local (Chennai / Bangalore ) Office should be available support
		b service support to be available from Chennai/ Bangalore by well trained and competent engineers. They should be able to undertake the AMC for the post warranty period .

		c	Trained engineers names and their certificated to be furnished along with proposal
38	Training		IIT personnel to be trained extensively at suppliers site and also at installation site free of cost on following aspects operations, programming, maintenance & troubleshooting minor repairs
39	Installation details		List of existing installations of the machine in India . customer references who are using the machine for the similar application .

### **Other requirements**

- Should be able to provide (as per order) custom designed stencil pattern for metal grid line printing on solar cell (from 5" square area to small area  $\leq 1$  cm<sup>2</sup> area cells)
- To at least 30 customers/labs similar machines Sold and Supported

### **Acceptance test**

- (1) Printing of thin metal (e.g. Ag) grids on silicon wafer and glass substrates demonstrated.
- (2) Smooth Functioning of the system.

## **Annexure II**



CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)  
INDIAN INSTITUTE OF TECHNOLOGY MADRAS  
CHENNAI 600 036



**B NAGARAJAN**  
**JOINT REGISTRAR (IC & SR)**

**Project Accounts**  
**July 22, 2016**

**TO WHOMSOEVER IT MAY CONCERN**

In connection with project, **US currency may be transferred to CANARA BANK, IIT - MADRAS Branch** with the following details.

**FOR TRANSFER OF CURRENCY US DOLLAR**

**Please Credit in USD**

**(THROUGH )**

JP MORGAN CHASE, NEW YORK  
SWIFT CODE: CHASUS33

**For Credit to**

USD ACCOUNT No: 001-1395969, of CANARA BANK INTERNATIONAL DIVISION  
MUMBAI

**For Further Credit to**

ACCOUNT NO: **2722101001741** of IIT Chennai – Swift Code: **CNRBINBBIIT**  
**OF THE REGISTRAR, IIT, MADRAS**

  
**JOINT REGISTRAR (IC & SR) i/c.**  
**संयुक्त कुलसचिव (आई.सी. एवं एस.आर.)**  
**JOINT REGISTRAR (IC & SR)**  
**आई.आई.टी. मद्रास**  
**IIT, MADRAS**

**This is to certify that the particulars furnished are correct.**

*For Canara Bank*

**Senior Manager**  
**Canara Bank - IIT Madras branch**



**एस.अरवींदन**  
**S.ARAVINDAN**  
सिनिअर प्रबन्धक Senior Manager  
प.अ.सं. S.P.No.31649