INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai 400076.

PR No. 1000047041 RFQ. No.3600002956

Technical specifications of 182 mm x 182 mm sized (should be upgradable to 210mm x 210mm sized wafers/substrates) fully automated cluster tool for perovskite-silicon tandem solar cells device fabrication

Introduction

This document outlines the specifications for a fully automated cluster tool designed for the fabrication of Perovskite-Silicon Tandem Solar Cell devices. The cluster tool features a central octagonal transfer chamber surrounded by eight processing chambers. To ensure optimal vacuum conditions for most processes, the system will incorporate a cryogenic pumping package with a vacuum requirement of 10^{-8} Torr having minimum pumping capacity of 1500 Liters/second. An exception to this is anticipated for specific chambers, such as a plasma cleaning chamber, where a turbo pumping package is expected to be sufficient. Operation of the cluster tool should be managed by an integrated, built-in control software system. This software to provide users with complete control over all aspects of the system and to also include remote connectivity capabilities for monitoring and operation. Brief details of the individual processing chambers that are required to be built are stated below:

Sr. No	Item Description	Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
1.	**Octagonal transfer/ central chamber**	The central element should be an 8-sided, high-vacuum octagonal transfer chamber with the features of computer-controlled robotic arm with X, Y, and Z axis movement, directed by the master computer for full system automation.		
2.	**Load lock chamber**	Side 1 of the octagonal transfer chamber interfaces should be with a Load Lock chamber (Chamber 1) that needs to accommodate a cassette holding at least 10 substrate holders		

		and the load-lock chamber further to connect a 6-port regular glovebox housing a slot-die coater and encapsulation setup.		
3.	**Perovskite evaporation chamber**	Side 3 of the octagonal transfer chamber to connect to the Perovskite Evaporation chamber (Chamber 3). This chamber should be, equipped with a minimum of six effusion cells (three RT-600°C, three RT-1000°C), is integrated with a mini-glovebox (2 gloves, small antechamber for precursor loading).		
4.	**Organic evaporation chamber**	Side 4 of the octagonal transfer chamber to connect with the Organic Evaporation chamber (Chamber 4). This chamber should be equipped with a minimum of six effusion cells (RT-1500°C), will deposit HTL (Hole Transporting layer) and ETL (Electron Transporting layer) materials and to be integrated with a mini-glovebox (2 gloves, small antechamber for precursor loading).		
5.	**Sputtering chamber**	Side 5 of the octagonal transfer chamber should connect to the Sputtering chamber (Chamber 5), which should be used for depositing transparent conductive oxides (TCOs). This chamber should feature two sputtering cathodes, one each for ITO (Indium Tin-Oxide) and IZO (Indium Zinc- Oxide) materials.		
6.	**ALD (Atomic Layer Deposition) via flipper chamber**	Side 6 of the octagonal transfer chamber should connect to a flipper chamber (Chamber 6). This chamber should invert wafers/substrates immediately before they enter the adjacent ALD chamber, which features two precursor lines each for SnOx (Tin Oxide) and Al2O3 (Aluminum Oxide) deposition.		
7.	**Metallization cum E-beam chamber**	Side 7 of the octagonal transfer chamber should connect to the Metallization chamber (Chamber 7). This chamber should deposit metal contacts, anti-reflective coatings, and Nickel Oxide (NiOx) HTL via e-beam, and includes three thermal		

		evaporation sources (for high-temperature metals) in addition to the e-beam source.			
8.	**Plasma treatment chamber**	Side 8 of the octagonal transfer chamber should connect the Plasma treatment chamber (Chamber 8), which will be used for cleaning wafers/substrates prior to device fabrication.			
9.	**Annealing cum EL/PL imaging chamber**	Side 2 of the octagonal transfer chamber should connect to the annealing chamber (Chamber 2), which will be used for annealing wafers/substrates as an intermediate step of device fabrication.			
10.	**Accessories**	a. Stand-alone slot-die coater which can cover M10 size b. Laser Scriber dual wavelength with sub nanosecond pulsed lasers c. In-situ monitoring for deposition of materials for thin-film d. Screen-printer for metallization of fingers and bus			
11.	**Payment**	• 10% upon completion and sharing of the detailed drawing & conceptual layout within 30 days from the date of PO. • Up to 30% against the invoices submitted for the purchase of ancillaries for building the cluster tool within 60 days from the date of PO. • 50% upon delivery of the instrument at our site within 240 days from the date of PO. Pre-dispatch inspection will be done by the PI and his team. • 10% after successful installation and **Site Acceptance Test (SAT)** (After successful completion of SAT at our site, within 60 days from the date of delivery.)			
12.	**Shipment and installation**	Delivery and installation at IIT Bombay, Mumbai, India, must be completed within 10 months from the date of the purchase order.			

13.	**Inspection**	The buyer's inspection shall be considered final at both the supplier's factory site prior to shipping (with an initial site visit after 5 months and a second visit during testing) and upon installation at the buyer's site (for Site Acceptance Testing - SAT).		
14.	**Warranty**	a.**1 Years** complete warranty after the completion of installation and SAT at customer site (excluding consumable parts). b. Lifetime telephone and online support should be provided. c. Telephone and email response times of less than 8 hours any day of the week.		
15.	**Utility requirements**	The vendor/manufacturer is required to provide detailed utility requirements along with the detailed drawings and conceptual layouts. Any modifications or changes to these requirements during the fabrication process must be communicated to the buyer in advance to allow for necessary arrangements prior to shipping and Site Acceptance Testing (SAT).		
16.	**Training at our site**	In-depth cluster tool training of at least 5 persons to be provided for a period of 1 week.		
17.	**Terms and conditions**	1) To be eligible, the vendor/manufacturer must have a track record of supplying at least two cluster tools of 4 inch of higher size connected to a hexagonal or larger dimensional automated transfer chamber to solar research or R&D entities in the last five years, with evidence of satisfactory on- site operation. Technical specifications of these installations must be included in the tender. 2) The provision of brochures or literature by the vendor/manufacturer is mandatory to demonstrate compliance with the technical specifications. 3) The vendor/manufacturer is required to submit conceptual layouts as part of their tender bid document and detailed drawings following the issuance of the purchase order. 4) The vendor/manufacturer shall provide a quotation for readily available additional tool upgrade options, including comprehensive information for each		

		option. 5) A detailed technical specification will be provided to successful prospective bidder after signing the non-disclosure agreement with IIT Bombay.		

Terms and conditions

1) The supplier/vendor/manufacturer is obligated to comply with the outlined payment terms and conditions, warranty stipulations, and other stated requirements.

MUTUAL NON-DISCLOSURE AGREEMENT

This Non-Disclosure Agreement ("Agreement") is by and between **Indian Institute of Technology Bombay**, a research and educational institution of national importance, set up by a Special Act of the Parliament of Republic of India, having its address at Powai, Mumbai 400076 (herein after referred to as "**IITB**") and **(Company Name)**, a corporation having a business address at **(Company Address)** (hereinafter referred to as "**Company**") on this _____**, 2019** being the date when this Agreement comes into force.

I. RECITALS

A. Company and IITB wish to exchange certain information pertaining to "_____". This exchange includes all communication of information between the Parties in any form whatsoever, including oral, written and machine-readable form, pertaining to the above which is indicated as confidential.

B. IITB and Company wish to exchange the information for the sole purpose of _____ and each Party regards certain parts of the Information it possesses to be secret and desires to protect those parts from unauthorized disclosure or use (such secret parts being hereafter collectively referred to as "Information").

C. IITB and Company are willing to disclose Information (as "Disclosing Party") and receive Information (as "Receiving Party") as the case maybe, on the terms and conditions set forth herein.

II. AGREEMENT

In furtherance to the above mentioned, IITB and Company agree to the following:

1. The Receiving Party will:

   a. Not disclose Information of Disclosing Party to any other person and use at least the same degree of care to maintain the Information confidential as Receiving Party uses in maintaining as confidential its own confidential Information, but always at least a reasonable degree of care; due diligence will be taken by both Parties in maintenance of confidential information.

   b. Use the Information only for the above mentioned purpose;

   c. Restrict disclosure of the Information of the Disclosing Party solely to those employees of Receiving Party having a need to know such Information in order to accomplish the purpose stated above;

   d. Advise each such employee, before he or she receives access to the Information, of the obligations of Receiving Party under this Agreement, and require each such employee to agree to maintain those obligations.

e. Within fifteen (15) days of notice furnished by either Party, the Party receiving such notice shall return to the other Party all documentation, copies, notes, diagrams, computer memory media and other materials containing any portion of the Information, or confirm to the other Party, in writing, the destruction of such materials.

2. This Agreement imposes no obligation on Receiving Party with respect to any portion of the Information received from Disclosing Party which

a. was known to Receiving Party prior to disclosure by Disclosing Party,

b. is obtained by Receiving Party from a third party under no obligation of confidentiality,

c. is or becomes generally known or publicly available other than by unauthorized disclosure,

d. is independently developed by Receiving Party or

e. is disclosed by Disclosing Party to a third party without a duty of confidentiality on the third party.

f. is required by law or decree.

g. is disclosed under an express written approval/authorization from the Disclosing Party.

3. The Information shall remain the sole property of Disclosing Party.

4. The Disclosing Party does not make any representations or warranties, whether written or oral, statutory, express or implied with respect to the information which may be provided hereunder, including without limitation, any warranty of merchantability or of fitness for a particular purpose. The Disclosing Party shall not be liable for any special, incidental or consequential damages of any nature whatsoever resulting from receipt or use of the information by the Receiving Party.

5. Neither the execution of this Agreement nor the furnishing of any Information hereunder shall be construed as granting either expressly or by implication, any license under or title to any invention, patent, copyright, trademark or trade name now or hereafter owned by or controlled by the Party furnishing the Information.

6. The Receiving Party will not export, directly or indirectly, any technical data acquired from Disclosing Party or any product utilizing any such data to any third party, without first obtaining approval of the Disclosing Party.

7. The rights and obligations of the Parties under this Agreement may not be sold, assigned or otherwise transferred (subject to contract).

8. The term of this Agreement shall be for a period of _____(___) year(s) and the obligations of confidentiality shall continue for a period of _____(__) year(s) after the termination of the Agreement. This Agreement can be terminated on thirty (30) days written notice by either Party. However, Receiving Party's obligations of confidentiality and restrictions on use of the Information disclosed by Disclosing Party shall survive termination of this Agreement for a period of ___ (_) years thereafter.

9. This Agreement will be construed and governed in accordance with the laws of Republic of India. Any dispute arising out or in connection with this Agreement shall be mutually settled by the Parties. However in case any dispute remains unsettled for a period of thirty (30) days, same shall be referred to the sole arbitrator to be appointed in accordance with The Arbitration and Conciliation Act, 1996 or any amendment thereof. The place of arbitration shall be Mumbai and language shall be English. For all other matters the jurisdiction of Mumbai courts shall prevail.

IN WITNESS WHEREOF, the Parties have executed this Agreement effective as of the date first written above.

For **Indian Institute of Technology Bombay**	For **Company Name**
Name : Date :	Name : Date :
Witness : Name :	Witness : Name :