Tender Notification for the procurement of an “Transmission Electron Cryo-Microscope (Cryo-TEM) with direct detection camera at the Indian Institute of Science, Bangalore”

Dear Sir/Madam, 03/10/2017

Subject: Request for quotation for Cryo-TEM with direct detection camera

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This is a request for a quotation for procurement of an “Cryo-TEM with direct detection camera” on C.I.P. Bangalore basis. Your quotation should clearly indicate the terms and conditions of the quotations, delivery, delivery schedule, entry tax, payment terms, warranty coverage, shipping location, mode of shipping etc., The quotation should be submitted in two parts: Part I (Technical bid) and Part II (Commercial bid) and both should be submitted in a sealed envelope. Technical bid should be exactly same as commercial bid except that prices are not shown in technical bid. Technical bid should have item wise compliance report of all specifications. Technical specification has two parts. Part A is the technical specification of a Transmission Electron Cryo-Microscope (Cryo-TEM) and Part B is the technical specification of a direct detection camera. Tenderer can participate for Part A or Part B or both (Part A and Part B).

The commercial bid should have pricing for each of the items quoted in the technical bid. Prices quoted should be inclusive of all taxes / duties. The prices quoted should be inclusive of delivery of the items to the site and installation at site and should include Euro and/or US dollar quotes. The last day for submitting the bid is November 15, 2017. The offer should be valid for a period of at least 60 days from the last date for submission of quotes.

Technical specification (PART A)

1. Introduction and Summary

1.1. The contractor will manufacture, supply, deliver, position, install, test and commission one Transmission Electron Cryo-Microscope (Cryo-TEM) for Life Sciences at the Indian Institute of Science (IISc), Bangalore.

1.2. The Cryo-TEM covered by this specification will provide IISc with the state-of-the-art, high-resolution electron cryo-microscopy for a wide variety of research applications, optimized for **automated single particle analysis and electron-tomography**.

1.3. The microscope will be used to conduct research in the areas of structural biology and cell biology, and will involve the recording of images of unstained, rapidly-frozen thin films or high-pressure frozen and sectioned biological material, with specimen thicknesses up to 1 µm (one micrometer).

1.4. The microscope will be operated at up to 200kV (two hundred kilovolts) and will be equipped with a high DQE electronic camera (Specification as mentioned in PART B). A back-thinned direct electron detector type of camera is preferred. Moreover, the size of the sensor should be at least 4Kx4K (four thousand by four thousand) pixels

1.5. IISc invites tenders for the described Transmission Electron Cryo-Microscope (Part A) and direct detection camera (Part B) below.

1.6. The expectation is that a purchase order will be placed before end of January 2018 for delivery no earlier than 1st May 2018, but as soon after that date as possible, into a room in the Biological Sciences building in IISc.

2. Electron Microscope Specification & Function

2.1. The TEM installed at IISc will be part of a national facility available to multiple users ranging from expert to non-expert users and the TEM offered in the submitted documentation will be expected to be intuitive, user-friendly, robust and adaptable with the capability to accept future upgrades and improvements.

2.2. The proposed TEM will be fitted with controls that are simple enough to be understood by a ‘non-expert’ user and robust enough for heavy daily use, usually for 24 (twenty four) hours per day and 7 (seven) days per week.

2.3. It is expected that all day-to-day controls incorporated into the proposed system will be clearly labeled and intuitive enough for a ‘non-expert’ user.

2.4. It would be desirable for advanced controls to be ‘hidden’ so that use is limited to expert users or service engineers. A software design to allow different level of users in terms of control and safety is desirable.

2.5. The insertion of the specimen into the TEM vacuum via the air lock should be quick and

easy, so that successive grids or preferably multiple grids can be loaded, then the grid(s) can be inspected, an image focused and recorded and the grid removed ready for a new specimen, all within a cycle time of 30 (thirty) minutes.

2.6. It is expected that the microscope has fully automatic differential oil free pumping system and ion pumps. The system should have sufficient number of Ion Getter Pumps Column, Gun and Specimen chamber. Suitable vacuum pump for Camera Section should be provided. Fully automatic sequential control for operation of vacuum pumps is required. Pumping time from start to ultimate vacuum should be less than 60 minutes. FEG gun area vacuum should have pressure $\leq 10^{-7}$ Pa and TEM column area vacuum should be $\leq 10^{-6}$ Pa.

2.7. It is essential that the microscope should have an automatized system to load multiple (6 or more grids) grids simultaneously into the microscope at and examined successively without breaking the vacuum. The grid exchange mechanism is expected to be highly automatic and reliable, suitable for high-throughput and free of ice contamination. The cold stage should be stable: 30 (thirty) minutes after specimen exchange, the specimen drift rate should be less than 0.25 (zero point two five) nm/s; and less than 0.05 (zero point zero five) nm/s at 60 minutes after specimen exchange.

2.8. The specimen tilt angle for the TEM should be able to tilt the specimen at least ±70° (plus and minus seventy degrees) for single-axis tilting.

2.9. It should be possible to use well-established low-dose imaging procedures, in which there are separate pre-set Search/Focus/Exposure conditions. The Search mode usually involves using a low magnification and very low dose rate, during which a grid is searched for suitable areas for later imaging at higher magnification. The Focus mode involves accurate focusing, normally at a higher magnification than used for the final exposure, on one or more adjacent areas of the specimen that are near the central area selected for later imaging. The Exposure mode is then used to record an exposure of the selected areas with minimal pre-irradiation. This would be the mode used for recording the highest quality images with minimum radiation damage either to frozen-hydrated biological specimens or other radiation sensitive specimens. Details of the proposed low dose imaging system should be included in the submitted documentation.

2.10. IISc will wish to link the data storage of the proposed TEM to its existing site-wide network so that remote access to, and analysis or manipulation of, data and images is available to users while the microscope is collecting primary data. The expectation of the IISc is that the proposed system will have a high-speed transmission capacity, e.g. 10Gigabit/second (ten) Ethernet or equivalent.

2.11. An option for a fully motorized X-Y sample stage should be provided as part of the proposed TEM, so that regions of interest can be identified, stored and quickly recalled with high reproducibility. Graphical indication of specimen grid position is desirable.

2.12. IISc expects the generated electron beam of the TEM to have an energy of **80-200 keV** (eighty to two hundred kilo electron volts) (variable either in steps or continuously) and the submitted documentation should clearly state the range of the system proposed by the tendering organization.

2.13. IISc expects the energy spread of the electron beam to be ≤1.0 eV (less than or equal to one point zero electron volts). The expectation of IISc is that the proposed TEM will be fitted with a field-emission gun (FEG) to generate an appropriate operational electron beam with high brightness, high coherence, and high stability for high-resolution imaging. The intensity of the beam should not decrease in time and should be constant at least for the 2 days (usually needed to collect a SPA dataset).

2.14. During cryo-EM use, the ice contamination rate should be less than 0.5 nm/hr (zero point five nanometer per hour). This is very critical requirement as it is expected that the data collection will be done for a longer period (2-3 days) and any contamination could be detrimental to quality of the data obtained.

2.15. The TEM system(s) proposed by the tendering organization will be expected to have a point resolution of better than 0.27 nm (zero point two seven nanometers), and a line resolution of better than 0.14 nm (zero point one four nanometers).

2.16. The TEM should be fitted with intermediate and projector lenses offering the following characteristics: The minimum range of camera lengths in diffraction mode should to be 200mm (or less) to 5000mm (or greater) (two hundred to five thousand millimeter) at 200 keV (two hundred kilo volts). The lens combination should offer a magnification range of at least 50x – 450,000x (fifty to five hundred thousand times). Magnification should be reproducible to within ±1.5% (one point five percent) and rotation-free. The submitted documentation should clearly state the range of the proposed system.

2.17. The system should be provided with constant power objective lenses that have a low hysteresis design. There should be minimal cross-talk between optical components and fast switching between different operational modes.

2.18. The proposed TEM should be fitted with the following aperture holders: an objective aperture holder, with at least four apertures appropriate for different imaging conditions; two condenser aperture holders (C1 and C2), each with at least four apertures; a selected area aperture holder, with at least four apertures. In addition, it is desirable that all aperture holders must be motorized, to maximize the degree of automation.

2.19. In the submitted documents, the tendering organization should provide details of any auto-focus / assisted-focus capability that can be offered with the TEM.

2.20. In the submitted documents, the tendering organization should provide details of any auto-drift compensation system that can be offered with the TEM.

2.21. A specimen anti-contamination device should be provided with the proposed TEM

system and this should include a Dewar capable of achieving a cryogenic 'hold time' of at least 96 (ninety-six) hours or an automatic filling system should be provided. Details of the proposed anti-contamination device should be included in the submitted documentation.

2.22. The proposed TEM will be fitted with a sample stage that is appropriate for the multi-user requirements of IISc and suitable for both cryogenic and ambient temperature use. The following features of the sample stage should be addressed in the submitted documentation: The sample stage will be computer controlled with a range of movement specified in mm for the X, Y and Z axes. The stage position should be reproducible: after a specimen movement of 500 (five hundred) µm in x and y, the stage should relocate sample position with a reproducibility of ≤0.5 µm (less than or equal to zero point five micrometers). Minimum movement increments should be less than 0.5 µm (zero point five micrometers) in X and Y directions and 0.5° (zero point five degree) tilt. The minimum tilt range expected by IISc is ± 70° (seventy degree). The maximum sample drift rate should be 0.01 nm/s (zero point zero one nanometer per second) after complete equilibration. At 30 (thirty) minutes after specimen exchange, the specimen drift rate should be less than 0.25 (zero point two five) nm/s; and less than 0.035 (zero point zero three five) nm/s at 60 minutes after specimen exchange. The specimen height should be adjustable to allow eucentric tilting. The eucentricity during $\pm 70^{o}$ tilting should be ≤ 2 µm (less than or equal to two micrometers) in X and Y, and ≤ 4 µm (less than or equal to four micrometers) in Z (defocus change). Details of the proposed TEM system capabilities against each of the above features should be included in the submission documents.

2.23. The proposed TEM system should be supplied with an appropriate tracking system**.** This tracking system should be capable or recording the specimen areas of the specimen that have been viewed, to prevent repeated imaging of the same sample area. Details of the proposed tracking system should be included in the submitted documentation.

2.24. The temperature of the frozen specimen in the microscope column should be ≤ 85K (less than or equal to eighty-five Kelvin), or the lifetime of a frozen-hydrated specimen should be at least 2 (two) days in the microscope column without detectable deterioration.

2.25. Any essential ancillary equipment for the microscope, such as water chiller(s) or air compressor, should be included as part of the tender proposal.

2.26. A general purpose fast CCD or CMOS camera is expected just beneath the fluorescence screen. This general-purpose camera is expected to be either retractable or in a near-axis position and housed in a manner compatible with easy and automated operation with a direct detection camera (Part-B). The camera should be fully embedded with data collection/application software and hardware component (such as PP). The System should be installed in an Enclosure that must ensure thermal and acoustic shielding with

20dBC and allowing below 0.5°C (zero point five degrees) temperature variation.

3. PC Hardware and Software

3.1. The proposed PC on which the electronic images are acquired should meet or exceed the performance of the following components (or equivalent) as a minimum:

3.1.1. 32GB (thirty-two gigabyte) four-channel 133MHz (one thousand three hundred and thirty three) memory;

3.1.2. 2TB (two terabyte) 7200rpm (seven thousand two hundred revolutions per minute) SATA hard drive(s) with 32MB (thirty two megabyte) cache;

3.1.3. NVIDIA Quadro FX 5600 (five thousand six hundred) graphics card with 1.5GB (one point five gigabyte) memory;

3.1.4. Option for high speed attached RAID storage for the PC (using FibreChannel);

3.1.5. Two large 30-40" (thirty-forty inch) or widescreens LCD monitors with 2560x1600 (two thousand five hundred and sixty by one thousand six hundred) minimum resolution.

3.2. The software provided to IISc as part of the proposed TEM system will include a range of 'pre-configured' settings that can be easily selected for use with the appropriate 'standard' samples. This could be demonstrated during the application support time.

3.3. The software provided as part of the proposed TEM system will allow multiple users to use the system, each with individual log-ins, user profiles, saved settings and acquisition protocols. This should be confirmed in the submission documentation.

3.4. IISc requests that the tendering organization provide basic details of the security settings that can be applied to each individual user and, where appropriate the degree of adjustment that can be made by any user within the preset security.

3.5. IISc will expect that the acquired data & metadata can be exported from the proposed TEM system in multiple formats (eg .mrc, .tiff, .jpeg, .txt, .xls etc). Details of the proposed software should be included in the tender submission along with any known, or suspected, incompatibilities with other software packages.

3.6. IISc will expect the software package provided with the TEM to include a 'browser' version to allow users an "off-line" capability to view images, export data & images as well as carrying out basic processing & analyzing functions. It is expected that such a browser would be free, or of minimal cost, and ideally available for Windows, Mac and Linux operating. Details of the proposed software should be included in the tender submission.

3.7. The software provided to IISc as part of the proposed system may also allow images & data to be exported in proprietary formats. Details of any such proprietary software should be included in the submission documents. The minimum data storage capacity of 10TB (ten terabytes) must have high-speed bus connections. Details of the data

storage and transmission rates should be included in the submitted documentation.

3.8. The software and hardware provided should also allow the remote controlled operation, including remote diagnosis and servicing.

3.9. The software controlling all detectors/cameras is expected to be fully embedded into the TEM's operation system. The safety controls must be implemented in software as well as in hardware for protecting the operators, instrument and specimens.

3.10. Automatic image acquisition software for single particle cryo-TEM is expected to be supplied, developed, installed and supported by the provider. Details of the proposed software should be included in the tender submission along with any known, or suspected, incompatibilities with other software packages. Automatic image acquisition software should be provided for free of cost. Automatic image acquisition software should be compatible with direct electron detection camera.

3.11. The software provided to IISc should be updated during annual servicing with available updates.

3.12. The software provided to IISc is expected with full documentation.

4. Training

4.1. All user training on the operation of the proposed TEM will be conducted at the IISc's premises in Bangalore by qualified Application Specialist.

4.2. Initial training will be provided to a small number (~five) of IISc personnel with the emphasis being on both theory and practical training in a small group to enable users to benefit from any advanced features of the TEM.

4.3. Initial maintenance training will be also provided to 2 (two) IISc personnel allowing basic procedures to be carried out in-house to maximize the potential uptime of the proposed TEM.

4.4. Should any revised software or hardware be installed on the TEM, then appropriate user training will be carried out by the tenderer at the time of installation.

4.5. The expectation of the IISc is that the tenderer can provide on-going support to the IISc system users and/or system maintenance personnel via a help desk, or similar arrangement, to maintain the optimal functionality and usability of the proposed TEM. In the tender response therefore, please advise what support can be offered, if not operating on a 24/7 (twenty four hours seven days per week) basis, please also state the times when such support would be available.

4.6. It is expected that comprehensive operational procedures and technical manuals will be provided for the proposed system(s).

4.7. The provider should have exceptional publication record in structural biology field and should have at least 10 prior worldwide installations with appropriate contact details for

referrals concerning user experience, maintenance issues and any other aspect as deemed fit by the technical committee.

4.8. The microscope should be provided with software to automatically perform daily tuning of the system; therefore enabling less experienced user to approach the microscope with ease. The automatic alignment available should at least include: Full Gun Alignment, Eucentric Height, coma-free and automatic objective stigmation. The microscope provider should also engage in developing software aimed to complete automation of the system

5. Delivery & Installation

5.1. The TEM will be delivered, installed and commissioned by the tenderer at Biological Sciences building, IISc on or soon after 1st May 2018.

5.2. It is expected by the IISc that all packaging, transit and other waste materials will be removed from the site by the contractor before final departure from the site.

5.3. After completion of the tender process, the successful tenderer will be expected to survey the proposed operational room to identify any potential sources of power spikes, surges or other electrical interference, or stray AC (alternating currents) fields or vibrations that might affect performance.

5.4. In case any such risk is thus identified, an additional quotation for appropriate counter measures should be included in the tender response.

6. Warranty

6.1. A minimum warranty period of 3 (three) years is expected for the proposed TEM.

6.2. During the warranty period, IISc will expect a maximum on-site attendance time of 24 (twenty four) hours from first notification of a problem with the TEM and a maximum fix time of 5 (five) days from first notification.

6.3. The tenderer will also include within the tender their current average on-site attendance time that has been achieved in responding to unplanned breakdowns plus their current average fix time to complete such repairs to equivalent TEMs installed at other locations in the India or outside of India.

7. Maintenance & Service

7.1. The tenderer will specify the appropriate planned preventative maintenance program, including the scheduled down time, in their tender response for the proposed TEM.

7.2. All preventative maintenance work on the proposed TEM will be pre-arranged during normal working hours with minimum down time of the equipment.

7.3. The tenderer will include with their tender response a list of spare parts (plus unit prices)

recommended to be held by the IISc to ensure that downtime of the TEM is not prolonged due to unavailability of such parts.

7.4. The tenderer will also include within their tender response a list of spare parts (plus unit prices) it intends to hold and/or holds as normal stock on behalf of the IISc to ensure that downtime of the proposed TEM system is not prolonged due to unavailability and also to replenish the items recommended to be held by the IISc.

7.5. The tenderer will include in their response, details of initial service and maintenance training that will be provided to representatives of the IISc necessary to ensure the satisfactory, safe and efficient operation of the proposed TEM and this will be included in the tender price.

7.6. The tenderer will include in their response, details of ongoing service and maintenance training that can be provided to representatives of the IISc necessary to ensure the satisfactory, safe and efficient operation of the proposed TEM system(s).

8. Accessories, Consumables and spares parts

8.1. Adequate spares and tools (for at least three years), which is immediately required for proper use and maintenance of the TEM should be provided by tenderer.

8.2. Sufficient consumables that may be required for loading the cryo grids and different types of grids should be provided by tenderer.

8.3. The tenderer should provide a suitable Glow Discharge Unit to perform hydrophobic/hydrophilic conversions of grids. The design of the unit should allow safe operation with appropriate safety interlocks along with easy-to-use user interface.

8.4. A separate carbon/metal coater unit should provided to prepare carbon coated or carbon/metal coated grid for cryo-EM purposes. The glow discharge unit combined with coater (for carbon as well as heavy metal coating) is also acceptable.

9. Miscellaneous

9.1. User Experience in terms of research publications using quoted or identical configurations.

9.2. The tenderer should provide the number of installations with proper references (at least 3 or more) of similar configuration in India or abroad.

9.3. IISc is also expecting that tenderer should provide an on-site engineer at IISc, who will be always available at IISc, and provide a service whenever it is required for cryo-TEM.

9.4. Tenderer should arrange at least one/two big LN_2 Dewar/s, which will directly connect with the microscope for constant supply of liquid nitrogen to microscope.

9.5. The tenderer should specify that the hardware components and the software meant to handle the microscope would not go obsolete for at least five years and the required spares would be available for at least seven years. A statement/letter to that effect may be included alongside the tender.

10. Costs

10.1. The tender response will provide a total life cost for the proposed TEM over a period of 10 (ten) years.

10.2. This costing will include, but not be limited to, the costs of power consumption, maintenance, spare parts and consumables.

10.2.1. Costs for hardware and/or software upgrades should be excluded from this calculation (and may be listed separately).

11. Safety Issues

11.1. It is expected by the IISc that the proposed TEM will be designed and manufactured to enable CE marking to be applied to the equipment.

11.2. The design of the proposed TEM will facilitate easy use, safe cleaning and incorporate appropriate interlock systems to prevent danger to the users.

11.3. Any exposed and/or working surface on the proposed TEM will be smooth, with reduced corners and no sharp edges to ensure user protection as well as ensuring that all surfaces are easy to clean.

12. Environmental Issues

12.1. The average power usage of the complete TEM being proposed should be stated in the submitted documentation based on a 24 (twenty-four) hour working day and 7 (seven) day working week, including any proposed different configurations, and should be stated in kW (kilowatts).

12.1.1. Note: this calculation will exclude the costs for both air conditioning and lighting of the room in which the TEM system will be installed.

12.2. The tender response will be expected to state clearly the maximum heat output of the proposed TEM system(s), including chillers, to allow the air conditioning requirements for the identified installation room to be checked in advance of installation.

12.2.1. Note: if there will be a significant difference between standby and full operation, details should also be included in the tender document.

12.3. If possible, the tender document should also provide an indication of the carbon cost for

the manufacture, supply and installation of the complete TEM system being proposed.

12.3.1. Note: it is recognized that the tenderer may have difficulty in preparing such a figure and would have to obtain such information from various suppliers who may not currently be able to provide the necessary data. As a minimum, can the tenderer list the country of manufacture for the major components and the final location of assembly.

13. Operational Room

13.1. The tenderer should specify room requirements for operation of the TEM including, but not limited to, the following criteria (using given units where applicable):

13.1.1. temperature (°C ± °C);

13.1.2. humidity (% RH ± % RH);

13.1.3. noise (dB);

13.1.4. vibration (□m/s for 1-500Hz).

13.1.5. AC stray magnetic fields (nT p-p at 50Hz)

13.1.6. Space requirement detailing room and door dimensions.

14. Equipment Programme

14.1. The following is a summary of the target programme dates for this project.

14.1.1. Note: this is subject to change and is to be used for guidance only.

14.2. IISc will agree the TEM delivery programme with the tenderer when the contract is awarded.

14.2.1. Earliest order for TEM placed with the tenderer: January 2018

14.2.2. Delivery and start of TEM installation by the tenderer: May 2018

14.2.3. Commencement of TEM commissioning by the tenderer: 1st June 2018

14.2.4. Completion of TEM commissioning by the tenderer and hand-over to the IISc: 30th June 2018

14.3. The tenderer will indicate in their tender response prospective dates or lead times for equipment delivery, site installation and commissioning plus hand-over. The tenderer should clearly mention proper location of shipment of the whole equipment at a time. In their quotation, tenderer should mention exact location of the shipment of the complete microscope and later on tenderer should not change the location of shipment. Partial shipment is strictly prohibited at IISc. The tenderer should pay more attention and clarify these issues at beginning. IISc is expecting a hassle-free procedure from tenderer to export and install the instrument.

14.3.1. Should there be any perceived significant risk to the predicted lead time due to

subcontractor or sub-supplier delays, then these should be identified in the tender response along with an estimation of the probability and impact of such an occurrence.

14.4. In the event of a delay to an individual component part or module of the system potentially causing excessive delay to the delivery of the complete TEM system, then the tenderer will be expected to advise on the practicality of installing the system without that part along with a revised timescale for fitting and integration of that part when it will be available.

15. Design Proposal

15.1. The tenderer will propose one, or more, TEM solution(s) to the IISc including the design, selection and sizing of all components and equipment to be used, such that they will provide a working and complete installation to satisfy the IISc stated requirements for full operational functionality in the identified working environment.

15.2. The tenderer will be responsible for ensuring the compatibility and integration of all parts of the proposed TEM system.

15.3. This will include all hardware and software whether they are provided by the tenderer, a subsidiary or related organization or an independent third party.

15.4. The tenderer will be fully responsible for the proposed design and liable for any mistake, inaccuracy, discrepancy or omission in their proposed solution to the stated IISc requirements.

15.5. Nothing contained in the tenderer's design or proposal will relieve the tenderer from their obligations or liabilities detailed within this document, and agreed or contained within any final contract documentation.

16. Innovation & Added Value

16.1. IISc will give due consideration to any tender response, whether of standard manufacture or of an alternative design solution that provides and delivers innovation, good design, accounts for on-going product development and clearly demonstrates measurable subsequent benefits.

16.2. IISc encourages tenderers to put forward value added solutions.

16.2.1. Note: any extra equipment or services offered free of charge as part of any value added solution should be itemized separately.

Tender Part B: Direct Electron Detector for cryo-EM at Indian Institute of Science, Bangalore

Summary: Suitable high-end PC with 64 bit software, for TEM image acquisition, manipulation & data collection with a user-friendly wizard for setup and automation of multi-region acquisition for better throughput for 3D cryo EM work.

1. IISc expects the proposed tender to be equipped with a high DQE electron detector (camera) for high-resolution data recording. A back-thinned direct electron detector type of camera is preferred. The camera should have at least 45% (forty-five percent) DQE at half Nyquist frequency at 200 keV (two hundred kilo electron volts). The detector should be highly sensitive for low-dose imaging (i.e. low read-out noise) when used with an exposure time of < 5 s (less than five seconds). The detector should have reasonable radiation hardness for electron energy up to 200 keV (two hundred kilo electron volts) e.g. a lifetime of >500 (more than five hundred) million electrons/pixel. The details of the detector's specification and possible upgrading should be included in the submitted documentation.
2. The physical pixel size of the detector is expected to be smaller (5 microns) with a sensor read out of at least 400 frames per second.
3. The detector and software provided should be able to do sub-pixel averaging for more accurate determination of incident electrons.
4. It should be possible to observe Thon rings in a high-dose image from an amorphous carbon or Pt-Ir specimen out to the Nyquist resolution in the Fourier transform of an image that is at least 4Kx4K (four thousand by four thousand) pixels.
5. It is expected in the near future an energy filter will be mounted as an upgrade to the microscope. We expect that the above mentioned detector can then be moved at the end of the energy filter.

2. PC Hardware and Software for direct detector operation

2.1. The proposed PC on which the direct detector images are acquired should meet or exceed the performance of the following components (or equivalent) as a minimum:

2.1.1. Intel Xeon E7-8837 (eight thousand eight hundred and thirty-seven) with eight cores, or better PC;

2.1.2. 32GB (thirty-two gigabyte) four-channel 1333Mhz (one thousand three hundred and thirty three) memory;

2.1.3. 10 TB (two terabyte) 7200rpm (seven thousand two hundred revolutions per minute) SATA hard drive(s) with 32MB (thirty two megabyte) cache;

2.1.4. NVIDIA Quadro FX 5600 (five thousand six hundred) graphics card with 1.5GB (one

point five gigabyte) memory;

2.1.5. Option for high speed attached RAID storage for the PC (using FibreChannel);

2.1.6. Two large 30" (thirty inch) wide screens LCD monitors with 2560x1600 (two thousand five hundred and sixty by one thousand six hundred) minimum resolution.

2.1.7. Note that the PC system could be the same one requested in section 3. or a separate PC system.

2.2. The software provided to IISc as part of the proposed the System will include a range of 'pre-configured' settings for operating voltages between 80 and 200 keV (eighty and two hundred kilo electron volts) that can be easily selected for use with appropriate 'standard' samples. This should be confirmed in the submission documentation. Tenderer should provide software for automatic data collection for single particle analysis and tomography and update it as and when required. IISc expects that the tenderer should provide this free of cost and update the software time to time basis.

2.3. IISc expects that the images, data and metadata acquired, and subsequently analyzed and/or manipulated, by the user will be saved in a default format that is widely compatible with other software packages. Details of the proposed software should be included in the tender submission along with any known, or suspected, incompatibilities with other packages.

2.4. Tenderer should provide a proper frame alignment software to align the movie frames of collect movie images using the detector (why is this necessary?).

2.5. It is expected that the acquired data & metadata can be exported from the proposed EF system in multiple formats (eg .mrc, .tiff, .jpeg, dm3, .txt, .xls etc). Details of the proposed software should be included in the tender submission along with any known, or suspected, incompatibilities with other software packages.

2.6. The IISc will wish to link the data storage of the proposed PC to its existing site-wide network so that remote access to, and analysis or manipulation of, data and images is available to users while the detector is collecting primary data. It is expected that the proposed system will have a high-speed transmission capacity (e.g. 10Gb/s (ten Gigabit/second) Ethernet or equivalent.

2.7. The software controlling the detectors is expected to be fully embedded into TEM's operation system.

2.8. The safety controls must be implemented in software as well as in hardware for protecting the operators, instrument and specimens.

2.9. Automatic single particle analysis and tomography data acquisition software(s) is(are) expected be provided and embedded. Details of the proposed software(s) should be included in the tender submission along with any known, or suspected, incompatibilities with other software packages. The software(s) provided to IISc should be updated during annual

servicing with available updates.The software(s) provided to IISc is expected with full documentation.

3. Training

3.1.1. All user training on the operation of the proposed DED will be conducted at the IISc's premises in Bangalore by qualified Application Specialist.

3.1.2. Initial training will be provided to a small number of IISc personnel, who will directly involve for cryo-EM data collection. Tenderer should provide both theory and practical training in a small group to enable users to benefit from any advanced features of the DED.

3.1.3. Initial maintenance training will be also provided to 2 (two) IISc personnel allowing basic procedures to be carried out in-house to maximize the potential uptime of the proposed DED. Tenderer also should provide a proper training to use the automatic data accusation software.

3.1.4. Should any revised software or hardware be installed on the DED, then appropriate user training will be carried out by the tenderer at the time of installation.

3.1.5. It is expected that comprehensive operational procedures and technical manuals will be provided for the proposed system(s).

3.1.6. The provider should have exceptional publication record in structural biology field and should have at least 10 prior installations with appropriate contact details for referrals concerning user experience, maintenance issues and any other aspect as deemed fit by the technical committee.

4. Delivery & Installation

4.1. The detector will be delivered, installed and commissioned at the same time as the microscope by the tenderer in the Biological Sciences building in IISc as soon after 1st May 2018 as possible.

4.2. It is also expected that vendor should perform all the necessary test and compatibility issues of camera and microscope at the manufacturing location of microscope. **No test is permissible at the site of installation or during installation.** IISc will not allow any compatibility testing at the site of installation or during the time of installation (at Biological Sciences building at IISc).

4.3. It is expected by the IISc that all packaging, transit and other waste materials will be removed from site by the contractor before final departure from that site.

5. Warranty

5.1. A minimum warranty period of 3 (three) years is expected by the IISc for the proposed

detector.

5.2. During the warranty period, the IISc will expect a maximum on-site attendance time of 24 (twenty four) hours from first notification of a problem with the detector and a maximum fix time of 5 (five) days from first notification.

5.3. The tenderer will also include within the tender their current average on-site attendance time that has been achieved in responding to unplanned breakdowns plus their current average fix time to complete such repairs to equivalent detectors installed at other locations in the India.

6. Innovation & Added Value

6.1. IISc will give due consideration to any tender response, whether of standard manufacture or of an alternative design solution that provides and delivers innovation, good design, accounts for on-going product development and clearly demonstrates measurable subsequent benefits.

6.2. IISc encourages tenderers to put forward value added solutions.

6.2.1. Note: any extra equipment or services offered free of charge as part of any value added solution should be itemized separately.

The documents may be addressed to the Chairman, Molecular Biophysics Unit (Kind attention: Dr. Somnath Dutta), Indian Institute of Science, Bangalore 560 012. Last date for receiving queries: November 5, 2017. Please email somnath@iisc.ac.in.

The last date for submission of quotations is November 15, 2017.

Thank You,

Sincerely,

Somnath Dutta
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(On behalf of the purchase committee)