

Technical Specifications of Chemical Phase analysis by Compact XRD**1.0 Bidder Eligibility Criteria-I**

Sl. No	Bidder Eligibility Criteria-I	Complied / Not Complied	Reference Page No.	Remarks, If any
1	The bidder/OEM should have supplied at least 10 or more installations of the system or similar items of same make to IITs, NITs, IISERs, CSIR Labs or other Govt. R&D organizations in the last 7 years, PO copies or installation certificates along with contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation.			
3	The bidder should clearly mention about their service set up in India (preferably in South part of India) for prompt service support along with contact details of service engineers specially trained on the offered system. Service should be provided within 48 hrs from the report of technical problem so that machine down time is minimized. In case the Equipment / System remains non-operational for more than 5 days then warranty period will be extended for the equivalent period for which Equipment / System remained non-operational. Warranty extension in such case shall be done without prejudice to any other Term & condition of the contract.			

2.0 Technical Specifications II

Specifications for “Chemical Phase analysis by Compact XRD”

Compact Benchtop X-ray analyzer for phase identification and phase quantification of various samples along with capability for In-operando analysis of Coin Cells, Pouch Cell with facility for mounting electro chemical cell with Z height adjustment stage. The system should also have present & future upgrade capability for mounting non-ambient temperature dependent studies stage, 2D detector etc. The instrument specifications as outlined below.

Basic System Configuration:

Sl. NO	SPECIFICATIONS		Complied / Not Complied	Reference , Page. No.
X-ray Generator & X-ray Tube				
1.	Continuous rated output	600W or higher		
2.	Voltage	40.0 kV or higher		
3.	Current	15.0 mA or higher		
4.		HT Stability better than +/-0.01% for Mains stability +/- 10 %.		
5.		Fine Focus Cu Anode X-ray tube.		

6.		Tube cooling internal. No external chiller Should be required		
Goniometer				
7.		High Precision, vertical type		
8.		Goniometer with theta - theta OR theta-2theta Geometry		
9.	Range	-2° to 142° 2Theta or better		
10.	Radius	145 mm or more		
11.	Scanning Speed	0.01 ~ 100 degree/min or better		
12.	Minimum Scanning speed	100deg/min or better		
13.	Minimum Step Size	Minimum Step Size: 0.001 deg or better		
Optics				
14.		Necessary incident beam slits and soller slits should be provided. The slits facilitate low angle diffraction typically from 1 deg onwards (total 3 nos.)		
15.		Necessary diffracted beam slits and soller slits should be provided		
16.		Suitable Ni k-beta filter should be provided.		
17.		Achievable resolution < 0.04° 2theta with NIST SRM LaB6.		
18.		Linearity < 0.04° 2theta with NIST SRM Si/Quartz/Al2O3		
19.		Beam Knife should be offered.		
Sample stage				
20.		Sample stage with spinning capability to improve particle statistics and remove preferred orientation issues.		
21.		Sample stage to mount coin cell (CR2032/CR2025/CR2016) for in-operando studies should be provided		
22.		Stage with adjustable z-axis for mount thin pouch cell of 0.5 mm or less for in-operando studies should be provided.		
Sample Holders				
23.		Sample Holder for Spinner Sample Stage to hold powder for Reflection Geometry – Minimum 3pcs		
24.		Air-Tight Sample holder for Spinning Sample stage to mount air sensitive sample in glove box and analysis in XRD should be provided		
25.		Minimum 2 no's of Zero Background sample holder for micro gram sample analysis should be offered having both cavity & flat surface.		
26.		Sample Holder for Spinner Sample Stage to hold Solid Flat Samples and powder for Reflection Geometry – Minimum 1 pcs		

27.		Sample holder for Coin Cell mounting along with 500 no's of Kapton films should be provided.		
Detector				
28.		High speed Solid State 1D Detector		
29.		Detector Should work in 0D,1D mode and also in scanning and static mode		
30.		Channels / Strips / Pixels : Minimum 125 No's or above		
31.		All Channels / strips/pixels should be active		
32.		2 Stage PHD Based fluorescence reduction mode should be available.		
33.		Pixel/Channel/Strip resolution of 100 micron or lower.		
34.		Detector should not require any external cooling.		
Software				
35.		Control, monitoring, data acquisition and processing software for the entire X-Ray Diffraction (XRD) system.		
36.		Simultaneous measurement and analysis capability.		
37.		The offered software should have facility to do background subtraction, smoothing, $K\alpha_1$ (K alpha 1), $K\alpha_2$ separation/elimination, peak search and match, multiple peak separation, multiple plotting, custom report generation, peak or line profile analysis.		
38.		This shall include phase analysis (qualitative and quantitative), crystallite size determination, % crystallinity, lattice strain determination, FWHM, particle size determination, 3D crystal structure display, indexing, lattice parameter calculation, Rietveld refinement, standard less quantitative analysis, Reference Intensity Ration (RIR), Phase mapping etc.		
39.		Software should be enabled with latest Rietveld algorithm for standard less quantitative analysis. Facility for Automated Rietveld quantification set up of sample should be available.		
40.		The evaluation software should able to find peak position by five methods i.e. Gravity, Sliding Gravity, Parabolic, Pseudo-Voigt and Pearson VII. Also Calculation of the stress tensor in the sample and principal coordinates for normal, normal & shear, biaxial, biaxial & shear, and triaxial stress models.		
41.		Single License ICDD PDF2 data base suitable for Phase ID Should be offered. ICDD database must be integrated into OEM analysis software's.		
42.		COD database integrated into OEM software's with search capability.		
43.		Analysed data to be in standard formats as well as made available in ASCII/CSV forms and exportable to popular platforms like MS Excel.		
44.		The Analysis software should be supplied with minimum 3 user license.		

45.		Latest versions running on Windows 10 operating system (64-bit) or better.		
Computer				
46.		One Internal/External PC for Instrument Control and additionally 1 or more External PC for data Analysis. The external PC should have the following minimum specification - Intel® Core i5, RAM: 16GB DDR3; HDD: 1TB; with Intel integrated Graphics card; DVD +/-RW; Monitor: colour LED-23" size; OS: Windows-10 (64-bit) or better licensed.		
Safety features				
47.		The system should be completely safe for x-ray radiations and complies to all international safety norms for x-ray safety, electrical and mechanical safety		
48.		The maximum radiation output from the system at a distance of 10cms should be less than 1µS/hour.		
Power supply				
49.		Single Phase, 200 to 230 V, 50/60 Hz		
Site Installation				
50.	Site Installation	Site Installation should be done by factory trained engineer		
Training				
51.	Training	Necessary training by a factory trained XRD Application Specialist at site.		
Warranty				
52.	Warranty	3 Year from the date of Installation of the BT XRD.		
Optional Items to be quoted with break up				
53.		A non-ambient heating stage with sample holder for Rt to +500 Deg in-situ temperature studies should be quoted.		
54.		Auto samplers		
Terms and conditions				
55.	Manual	Soft and hard copy of the manual should be provided with the instrument.		
56.	Test report	Test report of the instrument should be provided.		
57.	Installation	Installation should be free		
58.	Training	Training session related to equipment and software related to the system to be done atleast three times per year until warranty expire		
59.	Warranty	Minimum 3 years, Company must take responsibility to replace the consumables if needed during the three years of warranty Period.		

Service facility and down-time call attendance				
60.	Spares	Supplier should confirm the availability of spares for next 10 years from the date of installation. All essential spares for day-to-day operation needs should be provided as standard supply.		
61.	Pre-Installation Requirement	Necessary pre-installation advice should be sent immediately after the placement of the order.		
62.	Delivery Condition	The instrument should be delivered within 10-16 weeks.		

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the Above points with document proof as required. Failing which bidders will be technically disqualified)