

Ref. No PH/2016/166

1st September 2016

Dear Sir/Madam,

Kindly send your best quotation for the **UHV X-ray Photoelectron Spectroscopy (XPS)** with the following specifications on C.I.P. Bangalore basis. Your quotation should clearly indicate the terms of delivery, delivery schedule, E.D., payment terms etc. The tender should be submitted in two separate sealed envelopes - one containing the technical bid and the other containing the commercial bid, both of which should reach us, duly signed on or before 27th September 2016 to

**The Chairman
Department of Physics,
Indian Institute of Science, Bangalore 560012**

Please enclose a compliance statement along with the technical bid.

thanking you

Prof. P.S. Anil Kumar
Dept. of Physics
Indian Institute of Science

Specification

UHV X-ray Photoelectron Spectroscopy (XPS)

We are looking for multi user XPS facility. This will be handled by multiple users and hence it should be rugged and easy to use.

Presently XPS will be with Analysis chamber and load lock.

- 1 **Analysis Chamber:** UHV standard all mu-metal chamber. The chamber should have connecting flanges for connecting current and further equipment. Up to 25 ports to be provided for pumps, UHV manipulator, Electron energy analyzer sufficient number of view ports and ports for X-ray source, UV source, ion source charge neutralizer etc. Base pressure of analysis chamber should be in the better side of 10^{-10} to 10^{-11} mBar range.
Components of Analysis chamber
 - 1.1 **Gate valve (manual) between Analysis chamber and load lock/preparation chamber.**
 - 1.2 **Pumping System and gauges:** Ion pump (minimum of 400l/s) with power supply heater kit, tent and Titanium sublimation pump with power supply cable etc.
Appropriate vacuum gauge and vacuum controller should be included.
 - 1.3 **4-axis (optional LN2 cooling type) UHV manipulator:** All manual 4-axes (x-y-z-rotation) UHV manipulator with future upgrade to motorization at site.
 - 1.4 **Sample receiving station:** Sample receiving station (optional with heating and thermal measurement), complete with all electrical and mechanical feed-through and connections (appropriate thermocouple, 2 x BNC for sample potential up to 500V (drain current measurement), (optional provision for heating up to 15 A)
 - 1.5 **Appropriate Sample Holder**

2.0 XPS Analyzer: Hemispherical deflection analyzer completely designed of non- magnetic material with following Specifications:

- Radius: 150mm or more
- Number of slits: multiple
- Energy resolution: < 5 meV FWHM at 20 eV kinetic energy
- Energy resolving power factor: 1000 or better
- Pass energies: selectable from 1eV onwards
- (optional) Transmission and Angular lens mode
- lens acceptance angle (transmission mode): +/- 15°
- lens acceptance angle (angular mode): +/- 10°
- angular resolution : 0.1° minimum < 0.1mm spot size
- Acquisition modes: Fixed, Scan
- maximum energy window in fixed mode: 12.5% of pass energy
- kinetic energy range: 5-1500 eV
- mounting flange: Suitable
- bakeable up to 150 °C

CCD-MCP detector assembly characteristics with following characteristics or suitable detection system

- 30-40 mm diameter dual MCP detector
- more than 500 energy channels simultaneously available
- more than 200 angular channels simultaneously available
- 50 fps or better
- Pixel dynamic resolution: >7 bit
- detector modes: ADC

The analyzer package should include:

- Hemispherical deflection analyzer
- high stable and low noise electronics
- *appropriate* acquisition and analyzer control software for Windows OS
- Computer with latest specifications and windows software
- Monitor with CCD Camera for observation of sample and suitable pointer.
- Licensed XPS analysis software

ELECTRONICS SPECIFICATION:

- Temperature stability < 0.5 ppm/°C or better
- Noise < 500 μ V at 100V Low Energy Range
- Drift < 30 ppm/year
- Electric isolation 6 kV
- Min. step size HV100 4 mV
- Min. step size DAC 250 μ V
- DAC Bits 16
- Independent calibrated modules

3.0 X-ray Source: High intensity twin anode x-ray source with following specifications:

- Anode Al/Mg coating
- Power: Mg/Al, 400/600W,
- Anode voltage: 0-15 kV
- Filament emission: 0 -40 mA, resolution: 0.2 mA or better
- Cross talk < 0.5%,
- Magnetic field at sample below 0.5 μ T
- Bakeout up to 150°C

- Energy range: 0 – 20 keV
- Cathode Type: Thoriated Tungsten
- Filament current: upto 5A with 0.5A stability.

X-ray source to include emission controller, cooling box isolation unit with flowmeter, high voltage power supply, linear shift with z about 50mm or more.

4.0 Load Lock: Base pressure: 2×10^{-8} mbar or better. Include complete set of blank flanges, 2 viewports. appropriate storage container for load lock cover and hand gripper for sample holder. Include TMP: about 60l/s with dry scroll fore vacuum pump, safety valves, appropriate vacuum gauges and vacuum pump control systems.

5.0 Linear Transfer Arms: Linear transfer with forward movement. Appropriate length should be offered so as to add in future two level preparation chamber or buffer chamber in future.

6.0 Essential Items: Quote essential items extra sample holder, main frame, appropriate water chiller, bakeout set and illumination system for observation of the transfer inside chambers.

7.0 Installation: Please include free installation and demonstration at site and standard warranty of one year. All manuals should be in English both soft copy and hard copy should be supplied. Please offer CIP Bangalore Price.

Optional Items:

- 1.0 Additional Pumping system for analysis chamber: TMP of ~ 700 l/s and dry scroll pump of $15\text{m}^3/\text{hr}$ with Gate valve for TMP, safety valve, vent valve, tubing, wiring and vacuum control systems.
- 2.0 Motorization option for each axes.
- 3.0 Sample heating power supply
- 4.0 Halogen heating for load lock chamber.
- 5.0 UV Source to stage differentially pumped: The high intensity UV Source that can be operated with various discharge gases such as helium, neon, krypton, argon, xenon or hydrogen. Should include UV source, power supply, two stage pumping system for UV source, vacuum gauges and gas dosing system.
- 6.0 Flood Source: This is for charge neutralization of positively charged insulator or semiconductor samples.
Specification: Energy range: 0,01-10 eV and 10-500 eV. Spot size: 10 mm for distance 30mm (dependent on working distance). Cathode type: Thoriated Tungsten. Include power supply.
- 7.0 Ion Source: Two lens, extractor type, focused, differentially pumped ion gun for depth profiling (Ar), Energy range: $\sim 0.15 - 5\text{keV}$. Include appropriate power supply and gas dosing system (include all items like leak valve, connection hoses, pressure reduces & Argon bottle etc), suitable pumping system and gauges.
- 8.0 One level preparation chamber with ports for adding 2-3 K cells, cleaving system, Ion source, etc. Quote with appropriate pumping systems, gate valves, vacuum gauges, vacuum control systems.
- 9.0 Two level preparation chamber with ports for adding 2-3 K cells, cleaving system, Ion source, etc. Quote with appropriate pumping systems, gate valves, vacuum gauges, vacuum control systems.
- 10.0 (later on there is a possibility to add a preparation chamber between the load lock and analysis chamber hence please quote an optional item to include appropriate transfer arms with suitable length)
- 11.0 Optional LN2 shield in analysis chamber

- 12.0 **Sample Holder: with** Cooling module with large inner diameter inlet for LN2 dewar connection and outlet tubing (no freezing) connected to the liquid nitrogen reservoir which is directly connected to the sample mounting plate via a sapphire ball. Both rotations should be possible during cooling without detaching. Min. temp. with LN2: **100 K.**)
- 13.0 X-ray monochromator may be added at a later stage, hence the system should be able to accommodate this upgrade at a later stage

ACCEPTANCE

The supplier shall indicate acceptance standards for the instrument after installation at the Indian Institute of Science

Other requirements

- Please specify the training and operational plans for running the equipment.
- Quotation should carry proper certificates like agency certificate, preparatory certificate, etc.
- The indenter reserves the right to with hold procurement of final order. The right to reject or all split up the requirement or relax any or all of the above conditions without assuring any realer.
- If the goods are focused to be defective, they have to be replaced/rectified at the cost of the suppliers within 15 days from the date of receipt of written communication from us. If there is any delay in replacement/rectification, the warranty period should be correspondingly extended.
- **Terms and Conditions:**
 - Consumables including spare parts/maintenance kit for three years should be quoted in optional item
 - The vendor should have qualified technical service personal for the equipment based in India (preferably in Bangalore).
 - The payment will be through confirmed irrevocable letter of credit 80% on shipping 20% after installation and acceptance.
 - **Payment Terms:** Details of Payment terms will be negotiated with the lowest bidder.

Warranty requirements

- Quote warranty for 1, 3 and 5 years separately.
- AMC rates after warranty for 1, 3 and 5 years must be included separately.
- Indicate price for AMC

Please note following points at the time of sending your quotation.

1. Please quote the best price for FOB/CIF, Bangalore separately as per above specification.
2. Details of all taxes and duties must be clearly specified.

3. We are exempted from excise duty. Excise duty certificate will be provided by us.
4. We will also provide custom duty exemption certificate.
5. Please indicate the delivery terms clearly.
6. The quote should be valid up to 90 days.
7. Insurance should be covered from your warehouse to Indian Institute of Science.
8. Terms of payments should be clearly specified.
9. Please indicate country of origin of the material being supplied.

END
