



Indian Institute of Technology Kanpur

Advanced Center for Materials Science

Enq. No.: ACMS/ AU/ 2012-13/ E-15

Enquiry Dated: March 04, 2013

Closing Date: March 18th, 2013

ACMS requires the quotation for a Nanomechanical Testing System. The specifications for the equipment are in the addendum. The closing date for receiving the quotation is March 18th, 2013.

The prospective suppliers are required to send quotation in two parts in sealed envelopes, as “Technical Bid” and “Financial Bid”. The Technical Bid should contain detailed technical specification of the product being offered and should not mention any prices. The Financial Bid should include the detailed price quotation clearly including the cost of the equipment, taxes, service charges if any, shipping and handling charges. The two separate and sealed envelopes should be clearly marked appropriately as “Technical Bid” and “Financial Bid”.

Terms and Conditions:

1. Maximum education discount, if any should be offered
2. Validity of quotation should be at least for 60 days
3. Prices should be on CIF and FOB separately (if imported)
4. Prices should include the installation and training cost
5. Warranty should be for at least three years after installation
6. Normal payment terms for the Institute will be applicable (90% on delivery of the items and the remaining 10% after satisfactory installation/ inspection)
7. Quotation should carry proper certifications like agency certificate, proprietary certificate, etc.
8. An undertaking that the vendor will supply all the spares and services for the equipment for at least 5 years from the date of commissioning
9. Delivery must be within 6 months (updated March 7th, 2013)

Kindly send the Technical and Financial bids in sealed envelopes latest by 18th March 2013 by 5pm, to:

Dr. Anish Upadhyaya
Head, Advanced Center for Materials Sciences
IIT Kanpur, U.P. 208016, India.
e-mail: anishu@iitk.ac.in

Technical Specifications for Nano-Mechanical System

Nanomechanical Testing System Details and specifications*

Nano-mechanical Testing System/Nano Indentor with nano-scratch and nano-DMA with lock-in frequency module. The unit should be provided with following:

- Al sample standard for optics-to-tip calibration
- 2 no. Tips (Berkovitch type with 100 nm tip radius)
- 01 no. 90° cube corner tip
- 01 no. Berkovitch fluid cell tip
- cono-spherical $\leq 100 \mu\text{m}$ tip

Other details:

Supplied with reference material with elastic modulus and Poisson's ratio having been determined by ultrasound

The unit must have an ability to test with no manual adjustment of indenter position in any direction

The unit must have an ability to perform multiple tests on multiple samples both without user interaction and with option of delayed initiation of testing

Maximum data acquisition rate $\geq 12 \text{ kHz}$ with user-specified data recording rate with maximum data recording rate $\geq 500\text{Hz}$

Imaging system should have:

Optical magnification

Color camera with integrated video card

Image of sample surface available within test software for user specification of test sites; separate software for video display is unacceptable

Data analysis package should be having:

Automated calculation of peak force, peak displacement, hardness, elastic modulus, and work of indentation for each test

The unit should have a motorized x-y sample positioning system

It is desired that the unit should have an Environmental isolation system

The unit should have the ability to load using any of the following schemes:

Loading rate held constant

Displacement rate held constant

Loading rate divided by load (P'/P) held constant

Peak force up to 500mN applied in less than 2ms (step load)

Standard indentation system characteristics should be compliant with ISO 14577, parts 1, 2, and 3 Using standard indentation hardware or alternate hardware, the system must be operable in a mode such that it has the following characteristics:

Technical Specifications for Nano-Mechanical System

Software-controlled switching between high-resolution mode and standard mode with no manual configuration

Resonant frequency $\geq 160\text{Hz}$

Frame stiffness $\geq 3 \times 10^5 \text{ N/m}$

Radius of Berkovich tip $\leq 20\text{nm}$

* Force-application system having:

Maximum force $\geq 30\text{mN}$

Resolution $\leq 3\text{nN}$

Change in force to sense contact $\leq 40.0\text{nN}$

Displacement-sensing system having

Travel $\geq 50\mu\text{m}$

Resolution $\leq 0.002\text{\AA}$

Maximum indentation depth $\geq 50\mu\text{m}$

Other options desired:

1. Continuous-stiffness-measurement mode (CSM option)
2. High-force mode (High-load option)
3. Lateral-force-measurement mode (LFM option)
4. Thermal stage with capability to go up to 400°C

The system must be operable in a mode such that it has the following characteristics:

Ability to perform indentation or scratch testing on a heated sample with the standard indentation system described in section 4.2

Maximum sample temperature $\geq 350\text{C}$

Temperature control accuracy $\leq +/- 0.1\text{C}$

***Additional optional accessories should be indicated separately along with their price. The above specs are desirable and the actual numbers achievable for your system should be indicated.**