Indian Institute of Technology Kanpur

Call for quotation:
Electron microscopy sample preparation systems/accessories

IITK/CHM/sverma4/2012
Dated: 05.03.2012,
Closing Date: 12.03.2012

We are interested in acquiring the items listed below for High resolution TEM lab to augment specimen preparation infrastructure. Quotations in sealed envelopes are invited from the prospective vendors/suppliers for the items listed below:

1. Cryo-plunge for TEM sample preparation
2. Ion beam milling system
3. Complete cross-sectional TEM preparation kit
4. Advanced plasma cleaner for SEM & TEM samples & sample holders
5. Automatic twin jet electro-polisher for TEM sample preparation
6. Ultrasonic disc cutter
7. Disc punch
8. Disc grinder –manual with micro-meter controlled lead
9. Dimple grinder and accessories
10. Compact turbo pump based sputter coater/carbon coater
11. Low speed diamond saw along with appropriate cutting wheels

The following minimum specifications have to be satisfied for each of the items is detailed below.

1. Cryo-plunge for TEM sample preparation

a. Cryo-Plunge mechanism with pneumatically assisted, multi-positional plunge rod system
b. Plunge speed 1.7m/sec or greater.
c. Built-in Pneumatics system should provide minimum 60 psi (min 4.1bar) pressure
d. Specimen blotting pressure adjustable for 1- or 2-sided, and for single or multiple blotting with blot override capability.
e. Humidity chamber to avoid the specimen from drying during the blotting process. Maximum ambient temperature 25°C or greater.
f. Ethane temperature controller to accurately maintain temperature of ethane just above its melting point. Ethane pot capacity 4 ml or greater.
g. Liquid nitrogen stabilization time at maximum ambient temperature less than 15 minutes.
h. Cryo grid box transfer pot
i. Removable liquid nitrogen cryo workstation
j. Tweezers securing mechanism and quick disconnect mechanism to be in-built.
k. Safety interlocks to protect the user during blotting and plunging cycle.

2. ION BEAM MILLING SYSTEM

a. Dual Ion Source Guns

i. The system should have two ion guns that can be run either independently or together
ii. The voltage range of the guns should be from 100 to 6000 volts
iii. The current range should be variable from 0 to 100 micro Amps
iv. The current should be measurable for each gun independently with integrated Faraday Cups to the system.
v. The ion current density at the source should be ≥ 10 mA/cm2

b. Optical Microscope

i. A Stereo Microscope shall be available for sample viewing
ii. Reflected and transmission light should be available

c. Sample Holders

i. Compatible for 3mm disc samples
ii. The design should efficient thinning of sample only

d. **Vacuum Airlock** should be in place for intermittent monitoring of the milling process

e. Main Chamber

i. Mechanism should be available for Specimens rotation
ii. The rotation speed should be controllable manually
iii. Specimen stage cooling with LN2 Cold Stage and related controllers should be available & should be included in the offer.
iv. LN2 Dewar capacity to should ensure at least three to four hour operation per filling.

f. Gas Control System

i. The gas flow for each gun shall be independent
ii. The gas flow and therefore the current shall be set manually with a knob and the current measured during this process.
iii. Auto-terminator should be offered

g. Pumping System: Pumping should be based on appropriate turbo pump with an oil free backing pump to give a vacuum of 10^{-6} Torr as base pressure and between 5 to 9 $\times 10^{-5}$ Torr as operating pressure ; Vacuum Gauge should be present in the chamber area to read the vacuum in the specimen preparation area.

h. Produce Reliability and credibility: The quoted model should have proved track record in the global context and also clientele in premier Institution/lab of India

i. **User References**:The supplier should have at least 5 user references in India.

3. Complete kit for preparing samples for cross-sectional TEM of ceramics and electronic devices to go as accessory for ion milling system mentioned in Item No. 2
    a. List out all the parts included in the kit
    b. Offer additional Spares for atleast 2 years operation.

4. Advanced Plasma Cleaner for SEM & TEM Samples & Sample Holders
    a. Plasma Source
        i. The system shall have a low energy glow discharge ion source creating hydrogen and oxygen radicals.
        ii. The system shall have appropriate RF Source
        iii. The system shall have auto-tuning to couple the source to the chamber and generator
    b. Sample Holders
        i. Two ports shall be available to accept all side entry TEM holders
        ii. A 3rd large port shall be available for cleaning of irregular samples, SEM holders and other parts that may affect the performance in an electron column instrument.
    c. Vacuum System
        i. Vacuum pumping system shall consist of a two-stage diaphragm pumping stack backing a turbo molecular pump
        ii. The pumping system have very short pump down time.
    d. Main Chamber
        i. The chamber shall have two airlock ports to support all side entry TEM goniometers
        ii. A large entry port shall also be available for SEM holders, samples and other irregular shaped pieces.
    e. Gas Control System
        i. Gas flow controller shall be used
        ii. The system shall support a minimum of three gases these should include Argon, Hydrogen and Oxygen
        iii. The gas flow should be controlled using MFCs
        iv. System hould be capable of cleaning with minimal plasma damage.
        v. System hould be capable to clean holey carbon grids without damaging them. Data supporting this should be included along with the offer.
    f. Product Reliability and credibility
        i. The model quoted should have proved global record for the specific application.
        ii. The product should have clientele in premier institutions /labs of India.

5. Automatic twin Jet electro-Polisher for TEM Sample Preparation

a. **Basic unit:**
   i. The automatic electrolytic jet thinning equipment should be able to prepare a perforated specimen of 3mm diameter for TEM from a sample thickness of about 0.2mm to a thickness of less than 50nm.
   ii. The thinning unit should consist of a control unit, polishing unit.

b. **Control Unit**
   i. Output voltage should be in the range 0-100V DC and current in the range 0-2A.
   ii. Display of required parameters like current, electrolyte temperature .
   iii. Automatic stopping of the polishing process after polishing is completed.

c. **Polishing unit:**
   i. The polishing unit should be compatible to the control unit and the specimen should be Polished from both sides simultaneously, so that the structure is available with minimum deformation. The polishing unit should have the following features:
   ii. Machine should have a specimen holder for 3mm diameter and 0.2-0.3 mm thick specimens where one part of the holder should carry a platinum conductor so that electrical connection to the polishing circuit is automatically established.
   iii. Machine should have set of jets of 1mm diameter for thinning 3mm diameter specimens.
   iv. Appropriate detector to stop the thinning process automatically once the perforation appears.
   v. All the parts, which would be in contact with chemicals, should be made of corrosion-resistant material.

Note: If needed, Chiller for cooling of electrolyte can be out sourced from good branded Indian companies.

6. ULTRASONIC DISC CUTTER

a. Cutting tool 3 mm dia for brittle materials
b. Variable frequency tuner
c. Depth of cut display indicator
d. Spring loaded sample stage with x-y motion
e. consumables

7. DISC PUNCH

a. For 3 mm dia circular samples
b. Preferable user independent, horizontal cutting action

8. DISC GRINDER –manual with micro-meter controlled lead

a. Manual operation for 3 mm dia specimens
b. Specimen lapping kit with at least 3 glass lapping plates and 50 lapping discs
c. Disc mount with goniometer with atleast 10micron graduation on the scale
d. All required consumables

9. DIMPLE GRINDER WITH STEREOMICROSCOPE and accessories

a. Suitable For 3 mm dia samples
b. Dimpling depth down to 10 microns or less
c. Automatic termination of the process
d. Digital/ Analog Micrometer to indicate depth
e. All required consumables
f. A Stereo microscope is a must.
g. Hot plate for specimen mounting with thermostatic control of temperature and suitable sample mount holders

10. COMPACT TURBO PUMP BASED SPUTTER COATER / CARBON COATER for TEM specimen preparation applications

a. Metal sputtering and carbon evaporation – in one bench top design
b. Minimum 50L/s two-stage rotary pump, with oil mist filter
c. High vacuum turbo pumped Sputter Coating
d. High Current (>100mA) sputter Power Supply
e. Precise thickness control using the film thickness monitor
f. Stage should be Rotatable, with tilt and height adjustment
g. Automatic vacuum control should be provided, which can be pre-programmed to suit the process and material
h. The system should have Thick film capabilities – up to 60 minutes sputtering time without breaking vacuum
i. Full range vacuum gauge for low and high vacuum measurement should be provided

11. LOW SPEED DIAMOND SAW along with appropriate cutting wheels suitable for Metals, composites & ceramic material

a. CUT-OFF WHEELS FOR HARD AND BRITTLE MATERIALS
b. Cutting wheels - ~100 mm dia X 0.4 mm X 12 mm
c. Cooling fluid and other accessories
d. All required consumables & sample holders

For all equipments:

1. **Power supply:** 220-240V AC 50 Hz, Single Phase
2. Recommended spare parts and consumables for two years operation. Lists of items are to be provided.
3. .**Installation and Commissioning**: Product supplier should take responsibility to install and commission the equipment and all accessories and also demonstrate its performance at site.
4. **Training**: Manufacturer must take responsibility to train scientists engaged in the operation and routine maintenance of the each machine and its accessories.
5. **Guarantee/warranty:** The complete supply must be guaranteed for free repair/replacement for 24 months from the date of installation. After completion of 2 years, 3 years free service.
6. **After sales service support**: Please provide the following:
    a. List of similar units supplied / installed by the supplier in India
    b. List of service centers
    c. An undertaking that the service engineer will responds to service call within 48 hours of being informed of the problem.

Terms and Conditions: As per IIT Kanpur Rules

1. All the claimed specifications of the machine and the attachment should be demonstrated after completion of the installation at our site.
2. IIT Kanpur reserves the sole right to decide on the technical specifications over and above the specified ones and best suited machine configuration with appropriate attachments/accessories/add-ons.

Quotations should reached the following address
on or before 12 March, 2012 evening 5 p.m in closed envelopes.

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