



**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**  
**MATERIALS MANAGEMENT DIVISION**  
**Powai, Mumbai 400076**

**Corrigendum I**

**Revised Technical specifications for Optical Microscope with Hot Stage**  
**(RFX No. 6100000219)**

**Item 1: Optical Microscope (including polarizing, fluorescence, bright/ dark field)**

**Description:** Trinocular Upright microscope for reflected and transmitted light with bright field, polarization and Fluorescence contrast observation along with digital scanning camera.

**Microscope stand:** Upright, Frame should incorporate with built-in transformer/power supply. LED illuminator intensity control shall be frame mounted.

**Manual focus drive:** Coarse & Fine Focus drive of total range 25 mm or more. It should have a precision of 1 micron or better.

**Aperture & field diaphragm:** Built-in and adjustable aperture & field diaphragms

**Reflector turret:** Manual rotatable 4-position turret for reflected light observations.

**Objective nosepiece:** Manual rotatable 6-Position (sextuple) or 5-Position revolving nosepiece

**Observation tube:** Trinocular wide field tube with field of view of 25 mm or more with adjustable light path Selection of 100:0 /50:50/0:100. For observation it should have dual port for attaching two outputs (e.g. two cameras or one camera one spectrometer).

**Observation technique:** Bright field, dark field, reflected light, transmitted light, polarizing and fluorescence

**Illumination and light sources:** High power intense white light LED source for transmitted and reflected light. Both the reflected and transmitted light sources/ lamps should have a lifetime 20,000 hours or more. Dimmer knob is must for reduce/increase the light intensity. For that purpose, for reflected light source alternate 100 W Halogen light source will also be considered having at least 2,000 hours of lifetime. Appropriate converter is needed for both bright and dark field observation, when necessary.

For fluorescence pre-centred/ centre-able Mercury 100 W light source with lifetime 2,000 hours or more.

Reflected light LED/ Halogen and fluorescence shall be attached simultaneously on the system.

**Fluorescence filter cubes:**

Excitation: within 340-390 nm (UV excitation)

Excitation: within 400-450 nm (Blue Violet excitation)

Excitation: within 450-500 nm (Blue excitation)

Excitation: within 520-560 nm (Green excitation)

Will be used for fluorescence imaging and should be place-able in the optical path of the microscope

### **Polarizer and analyser**

Polarizer in slide bar/ slider polarizer, analyser rotatable. Should work at least for reflected light.

**Mechanical stage:** Appropriately ceramic coated scratch free mechanical stage with x-y movement of 75 x 50 mm with x-y control knob. Right hand low drive control (long type). It should be possible to use both reflected light and transmitted light samples. The z-position of the stage should be adjustable and fixable by screw. Mechanical x-y stage should be compatible and firmly fixable by suitable clamps with hot/cold stages Linkam THMS 600 and Linkam LTS 420.

**Objectives:** All objectives should be plan Semi-Apochromat suitable for reflected light and transmitted light observations in both bright and dark field. Should be suitable for fluorescence imaging. All the objectives should work in air medium (no oil immersion). Details of accepted range of numerical aperture (N.A) and working distance (W.D) are given below for each objectives of following magnifications:

5X: N.A within 0.13- 0.15; W.D within 13-20 mm

10X: N.A within 0.25- 0.32; W.D within 10-15 mm

20X: N.A within 0.4- 0.45; W.D within 6.5-15 mm

50X: N.A within 0.5- 0.6; W.D within 6.5-11 mm

100X: N.A within 0.75- 0.8; W.D within 3.3-4.5 mm

**Eyepieces:** A pair of focusable eyepieces of 10x with FOV of 25 mm or more

### **Item 2: Camera and Imaging software**

For microscope.

**Camera:** 5 Mega Pixel microscopic CCD/CMOS camera. Pixel Size: 2.2 x 2.2 micron, minimum or higher. Live image displays through PC monitor, with a speed of 15 fps or more at the 5 Mega Pixel recordable capacity. Should have true colour compliance.

**Imaging software** – Imaging software should be provided with the microscope. It should be capable of live capturing of images. It must be able to capture series of sequential images (or stack of images sequentially) with intervals between images as less as 1 second or less. It should be compatible with PC and Windows OS. The software should be capable of doing image enhancement by adjustment of brightness, contrast etc. It should be possible to perform common measurements like distance, area, perimeter, angle etc. on captured images. Camera and software should be well synchronized and compatible.

Microscope and camera/ software should be from same manufacturer.

**Item 3: Heating & cooling stage (smaller sample area)**

**Linkam THMS 600 Heating & cooling stage** with temperature range of -196 to 600°C.

Accessories: XY sample manipulation, T 96 Linkpad controller (USB interfaced to connect with PC), Link system control and imaging software. This software should be linkable with third-party (non Linkam) microscope and camera. Other accessories like pumps, connecting pipes & wires, Dewar (2 lit.) must be provided with the stage.

**Item 4: Stereomicroscope**

Stereo microscope with Greenough or Cyclooptic optical system. Must be operated in reflection mode. Transmission mode is optional.

Zoom ratio should be any one of these: 6.7:1 (0.67x-4.5x), 5:1 (0.8x-4x), 7.5:1 (0.67x-5x), 4.4:1 (0.8x-3.5x) or 4.4:1 (1.28x-5.6x)

Additionally, 10X eyepiece with FOV 20 mm or higher needed.

Objective shall permit working distance of at least 100 mm (or higher).

White LED light for reflected/transmitted illumination with knob to control illumination.

3 – 5 MP CMOS or CCD digital camera along with appropriate interface (e.g. USB) to connect to PC. Software to be provided for image capture having live acquisition possibility. Camera and software should be well synchronized and compatible.

**Others-**

Free installation at user site and training to experts. General maintenance troubleshooting of the microscope during warranty period.

Vendor must have an installation of specified offered system within India which is working satisfactorily. Details to be mentioned in the technical bid.

If necessary, the offered system (microscope portion at least) need to be shown as a live demonstration, when called for.

  
Joint Registrar (MM)