



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

**Purchase Requisition No.1000008114 (RFx No.6100000114)**

**Technical Specification for Inverted Microscope**

**1. Microscope Body:** Motorized Ergonomic Stand with inbuilt motorized Z-focus drive with minimum step resolution of 10 nm or better. The microscope should have 1.5\1.6X or better Motorized/Coded magnification changer/status detection for eyepieces and ports. The microscope should have both Coarse and fine focusing knobs in main frame or separate controller for minimum intervention and vibration. The system should have a touch screen for necessary control and indications of motorized functions of microscope.

**2. Objectives:**

- a. Semi-Apochromat grade 4x or 5x with NA .13 or more, PH, working distance (WD) 16mm or more.
- b. Semi-Apochromat grade 10x, N.A.0.30 or more, PH WD 10mm or more.
- c. Semi-Apochromat grade 20x, N.A. 0.4 or more, PH WD 6 mm or more. Cover glass correction: 0-2.0 mm.
- d. Plan Apochromat 60/63x, N.A. 1.40 or more, DIC, Oil immersion. WD minimum 0.12mm.
- e. All objectives with better NA & WD are preferred. All objective lenses should compatible with the provided microscope. All the objective lenses should have appropriate working distance.

**DIC:** Motorized Analyzer Cube, Motorized Polarizer, and necessary DIC prisms for Condenser and Objectives should be offered.

- DIC Prism for 60x/63x objective.
- ICT/DIC condenser prism.

**3. Transmitted Light system:** Transmitted column with Field Diaphragm, equipped with White light LED Illumination (>25000 hrs lifetime) with intensity control by main frame inbuilt knob or by Touch Panel Control.



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**4. Imaging Ports:** The Microscope body should have motorized

- 100% Eye-piece
- 100% Left Side port
- 100% Right side port/Trinocular Port.
- 30% eye-piece - 70% side/left port or 20% eye-piece - 80% side/left port, 50% eye-piece - 50% side/left port
- **Eyepieces & Eyepiece Tube:** Tube, Binocular 100/0, , Field of view 22 mm or more, Variable viewing angle 10-15° to 40-45°.

**5. Camera:** Two cameras are to be provided. One monochrome and one Color. Specs of the two cameras are given below:

**A. Camera-1 (Monochrome) Specs:**

- **Sensor type:** Front Illuminated Scientific CMOS (sCMOS)/ Active Pixel CMOS
- **Sensor size:** 11.3 x 7.1mm, Image diagonal 11.3mm or 1/1.2" sensor or higher
- **Quantum efficiency (QE):** 78% or higher.
  - **Active pixels:** 2.3 Mega Pixels or higher
- **Color depth:** 14 bit or more
- **Pixel readout rate (MHz):** Slow read 200 (100 MHz x 2 sensor halves) or more, Fast Read 540 (270 MHz x 2 sensor halves) or more.
- **Frame rate:** 100 FPS at 1920 x 1216 or better; 180 FPS or more @ 1920 x 1080, 400FPS or more @ 512 x 512.
- **Readout modes (Shutter control):** Rolling and Global shutter
- **Data range:** 12-bit, 14bit, 8-bit (optional)
- **Maximum dynamic range:** 25000:1 or more.
- **Region of Interest (ROI):** User-defined Region of Interest (ROI): Allowed, freely adjustable in 1 or 2 pixel steps up to full resolution
- Along with the above-mentioned features, the unit should be controlled from within the microscope software, it should provide excellent broad coverage of the VIS/NIR region, it



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should have 99.5% or more linearity for quantitative accuracy of measurement across the full dynamic range.

**B. Camera-2 (Color) specs:**

- **Sensor type:** Color CMOS/CCD
- **Sensor size** 0.5" or better
- **True Resolution:** 5 MP or greater non-interpolated
- **Exposure time:** 0.1 millisecond – 1 second or higher
- **Frame rate:** 15 FPS or more in full frame
- Along with the above-mentioned features, the unit should be controlled from within the microscope software. The camera should be designed for live cell applications with an operating environmental temperature of +5 °C - +50 °C. The camera should be able to capture crisp images with accurate color reproducibility.

**6. Microscope Stage:** Motorized X-Y Stage with controller and joystick to control X, Y & Z modules of microscope; having multiple holders to adapt stage inserts for 96 well plates, 35 and 60 mm plates, and glass slides.

**7. Nosepiece:** 6 position Motorized revolving nosepiece. Should be with Motorized multi-position DIC turret / slider.

**8. Condenser:** Motorized Universal Condenser suitable for all microscopy techniques such as Phase, DIC with 7 or more slots and with long working distance of 30mm or more. Phase module Ph1 & Ph2 should be offered.

**9. Motorized Epi-Fluorescence Module:** Motorized fluorescence turret with built in shutter and a minimum of 6 position filter cube slots for band pass (Excitation and Emission) interference fluorescent filters.

**10. Fluorescence Light Source:** 120W/130W Mercury/Metal Halide light source with minimum 2,000 hrs of life time. The unit should be controlled by same imaging software. Should have option for controlling intensity.



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**11. Excitation Filters:** Band pass fluorescence filter sets for DAPI, FITC, TRITC and Cy5.

All filters should be with zero pixel shift technology for true localization of fluorescence signals and better transmission efficiency.

**12. Software:** Imaging Software to control all motorized Microscope components, DIC components, XY Stage and Camera's for acquisition of images in Z- Series, Multi-Channel Mode, Time Lapse imaging, multi-point time lapse imaging, full six-dimensional image acquisition and analysis (X, Y, Z, Time, Multi-Channel & Multipoint). Should have modules for Image stitching, tiling and measurement with analysis. Should be equipped with Intensity measurements for line, 2D/3D View, area in multi-dimensional images with features to export to MS Excel. Software autofocus feature should be provided.

3D Deconvolution software for deconvolution of fluorescence images using different algorithms based on nearest-neighbor, no neighbor Algorithms, Inverse Filter Algorithms, Iterative algorithms or similar, should be provided **OR** Automated hardware based optical sectioning device should be provided.

**13. Computer:** One Factory tested and recommended Workstations with minimum 3GHz processor, 16GB RAM, 2GB Graphics Card, 1TB HDD required and LED/TFT Monitor along with Keyboard and Mouse. The size of the monitor should be such that the software is easily viewable.

**14. Other condition:** Microscope, Color Cameras, XY Stage, fluorescence filters and software should be compatible and from single manufacturer for best performance. Scientific CMOS camera should be compatible with same imaging software.

**15. UPS Backup** for atleast 30 mins

**16. Extended Warranty** for 2 years from manufacturer