

## Chapter-4 (Revised)

### Upright Metallurgical Microscope with Digital Imaging Facility

	<b>Specifications</b>
<b>Microscope</b>	<ol style="list-style-type: none"><li>1. Microscope should have reflected light LED / halogen (12v-100w) illumination with constant color temperature and a built-in stable power supply. It should have contrast technique like Bright field, Dark field, Polarization and <b>DIC / C-DIC/ Oblique illumination Contrast</b>. Microscope should have rotatable analyzer (180° and 360°) and it is to be used for reflected light.</li><li>2. Revolving nosepiece should have minimum 5 or more folds for Bright and Dark field objectives. Revolving nosepiece should be manual. User should have facility to choose magnification scaling during acquisition of microstructure.</li><li>3. Microscope should have an infinity optical system to retain constant magnification even if the distance between the objective lens and tube lens is changed.</li><li>4. Trinocular phototube should have adjustable viewing angle by tilting the binocular viewer. It should have a provision of interpupillary distance adjustment in the range of 55-75 mm. Beam splitter position should have provision of splitting the beam between eye pieces and camera in the range of <b>100:0 to 0:100 with intermediate provision like 50:50/70:30/80:20</b> to obtain uniform brightness.</li><li>5. Microscope should have XY-stage with hard coat anodized/ceramic stage plate or better grade plate. The stage travel distance in length direction should be at least 75 mm or more and in width directions should be minimum 50 mm or more to accommodate large travel distance. Stage should have stage bracket and manual XY-drive for its movement. Slide holder for metallurgical samples should be supplied.</li><li>6. Microscope should have minimum four positions reflector turret, which are for enabling different contrasting mechanism (bright and dark field). Aperture and field diaphragm should be center able. It should consist of slots for polarizers &amp; analyzer.</li><li>7. Microscope should have Semi-Apochromatic grade of objectives, suitable for bright field and dark field contrast for 5x, 10x, 20x, 50x and 100x magnifications.</li><li>8. Microscope should have wide-field eyepiece pair of 10x magnification with 22 field number or more. Both the eyepiece should be focusable &amp; the range adjustable.</li></ol>
<b>Camera</b>	Microscope should have high performance <b>Color Digital Camera System</b> . Basic resolution should be 1920 x 1200 pixels or more, having minimum pixel size of 5.5 µm x 5.5 µm or more for better sensitivity. A software controlling camera should have provision of variable image at an acquisition rate up to 30 frame per second (fps) or more. Software driver for proper synchronization of the camera should be included.
<b>Software</b>	Image analysis software with facilities for image calibration as per different objective magnifications, scaling / micron bar, measurement such as length, area, angle, annotation. Dedicated modules for multi-phase analysis, decarburization, inclusion

	analysis and grain analysis confirming to ASTM E112, E930, E1382, DIN/EN/ISO 643 standard.
<b>Computer</b>	Desktop Computer – should have i7 or advanced processor, 1TB hard disk, 8 GB RAM, 2 GB external graphics card and original Windows 10 operating system, wired optical mouse, wired keyboard, along with suitable system software. Monitor should be of minimum 23.8 inch.
<b>Power supply</b>	210 ~230 Volt, 50Hz single phase
<b>Essential Additional Supply</b>	The vendor should provide user, operational and <b>maintenance manuals</b> for both microscope and software's. The vendor <b>should provide necessary</b> tools and tackles for day to day maintenance of the microscope.
<b>Other parameters</b>	Comprehensive 12 months warranty should be provided on microscope, camera, desktop and all the provided software. <b>Vendor must transfer the warranty, if received for more than 12 months from the OEM of the outsourced peripherals such as camera, desktop, software, etc. to CSIR-NML.</b> Two years non-comprehensive AMC is required. AMC visit should have two preventive visits and one breakdown visit yearly. <ul style="list-style-type: none"> <li>• In price comparison, AMC and warranty are to be considered.</li> <li>• The date of manufacturing should be after the date of purchase order.</li> <li>• The specifications mentioned in the quotation should be supported by technical details/ brochure/literature and enclosed with the quotation. Otherwise, it will not be considered technically.</li> </ul>
<b>Qualification Criteria</b>	The party <b>must have</b> supplied minimum five or more similar kind of microscopes in last 3 years preferably in India
<b>Installation, commissioning and training at user's site</b>	By the supplier at supplier's cost