Laboratory Brief Overview

University/Institute: NED University of Engineering and Technology

Department: Metallurgical Engineering

Lab Name: Microscopy Lab

Lab In-Charge: Dr. Zubia Anwer

Email: zubia@neduet.edu.pk

Lab Overview

The optical microscopy lab serves to provide micro structural characterization, chemical analysis, qualitative and quantitative analysis of micro phases, fractography and failure analysis of materials.

Equipment

Equipment Name	Research / Teaching Applications
Stereomicroscope	Stereomicroscope also known as low magnification and dissecting microscopes. It has trinocular with wide. optical zoom range 0.7X - 4.5X and WF10X/20 eyepieces. Stereomicroscopy is widely used to identify the mode and the cause of small cracks and catastrophic failures, identifying the starting point and the nucleation point of failures as well as the stress relaxation lines. In addition, stereo microscopy can identify possible contamination on the surface of the materials.
Olympus GX51 Inverted Microscope	The Olympus stream software turns an Olympus microscope into an effective, high-performance analysis station. Its effective operation enables smooth image acquisition, filtering, measurement, documentation and archiving. The available magnifications are 50X, 100X, 200X and 500X.

Welding Expert	It is a groundbreaking welding quality tool for fast and highly accurate weld bead analysis. Just a few clicks and get image capture, measurements, archiving and complete quality control reports. The software package is 100% dedicated to the control and measurement of welds.
Inverted Metallurgical Microscope	A specialized microscope developed for observing at cross-sections of numerous metal and alloys . In general, these metallurgical microscopes employ high-resolution objective lenses having very short working distances with ease of working. This microscope comes with four objectives, a large mechanical stage and a 5MP digital camera, offering four magnification settings i.e.,100X, 200X, 400X, and 1000X. The specimen must be adequately prepared to ensure correct observation and interpretation of the microstructure without complications from artifacts due to sample preparation or etching.
Vacuum Desiccators	Electronic pump Perfect for chemical samples and crystal wafer/substrate away from moisture and air. Complete suction in only 2 minutes and maintain vacuum automatically. Silicone O-Ring seal.
Available Softwares for Imaging	**Grano- 200:** Image Capture, Save & Calibration Grain size determination in accordance with ASTM E112 and EN ISO 643 Instant detection of Grain Boundaries. **Nodula-200:** Image Capture, Save & Calibration Automatic detection and coloring of Graphite Nodules. Cast iron analysis according to EN ISO 945 including nodularity Ferrite/Pearlite fractions etc.

Research Applications / Areas

Grain size measurement (ASTM E112) for steels, aluminum, copper, titanium alloys.

Phase identification (ferrite, pearlite, bainite, martensite in steels).

Inclusion analysis (type, size, distribution of non-metallic inclusions).

Heat-treatment effects: microstructural changes after annealing, quenching, tempering.

Quantitative metallography with image analysis software (phase fraction, porosity, particle size distribution).

Academic and Industrial Applications

Taching & training tool for undergraduate/graduate students.

Supporting industry in weld procedure qualification as per standards.

Routine metallographic inspection for steel plants, foundries, aerospace, and automotive sectors.

Standardization & certification testing (ASTM, ISO).