


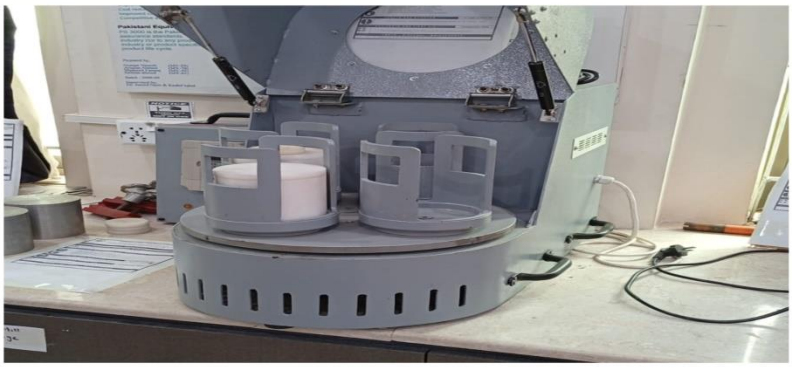

# Laboratory Brief Overview

University/Institute: NED University of Engineering and Technology

Department: Metallurgical Engineering

Lab Name: Advanced Materials

Lab In-Charge: **Dr. Muhammad Rizwan**

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## Lab Overview

The Advanced Materials Laboratory provides a state-of-the-art facilities for research and development in surface engineering, coatings, and materials characterization. The lab is supervised by Assistant Professor Dr. Muhammad Rizwan and is dedicated to advancing research in plasma-based surface modification, corrosion protection, and functional coatings for biomedical, aerospace, and energy applications.

A key highlight of the laboratory is the Plasma Electrolytic Oxidation (PEO) system, enabling the synthesis of ceramic and composite coatings on light alloys such as titanium, aluminum, and magnesium. This facility allows researchers to tailor surface properties for improved wear resistance, corrosion protection, and biocompatibility.

The lab is also equipped with a Corrosion Tester CS350 M, which provides electrochemical testing capabilities such as potentiodynamic polarization and electrochemical impedance spectroscopy, ensuring comprehensive evaluation of coating performance. For deposition of advanced thin films and functional coatings, the laboratory houses an Electrophoretic Deposition (EPD) unit, supporting the fabrication of uniform ceramic and nanocomposite coatings.

Supporting facilities include a water distillation unit and a deionized water system for high-purity solution preparation, magnetic stirrers for uniform suspension mixing, a fume hood to ensure safe handling of chemicals, and a pH meter for precise electrolyte characterization. Together, these instruments provide an integrated platform for materials synthesis, processing, and performance evaluation.

The Advanced Materials Laboratory has a proven track record in research training, having successfully graduated one PhD student and five MS students, with several more currently pursuing their advanced degrees. Several publications have already been produced from this lab. This highlights the lab's strong role in capacity building and in nurturing the next generation of materials scientists and engineers.

Serving as a hub for innovative research, training, and collaboration, the Advanced Materials Laboratory continues to foster scientific advancements in the field of functional and protective coatings.

## 2. Equipment List

| Equipment Name | Key Specifications | Research / Teaching Applications |
|---|---|---|
| Plasma Electrolytic Oxidation unit | AC/ DC and Hybrid mode Plasma Electrolytic Oxidation facility | Wear-resistant and adherent composite layer synthesis |
| CorrTest Electrochemical Workstation | CS 350 M | Electrolytic corrosion Testing |

## Research Applications / Areas

- Surface Modification
- Corrosion Testing

## Notable Projects

- National Research Program for Universities (NRPU) related to ‘‘Bioactive and Antibacterial Microcar Oxidation Layer on Biodegradable Magnesium Alloys for Biomedical Implants’’ worth PKR 6.7 Million.

Sindh Research Support Program (SRSP) (FY-2021-2022) ‘‘Plasma Electrolytic Oxidation (PEO) of TiAlV alloy in order to develop Bioglass based composite layer for bone and dental applications’’ worth PKR 4.3 Million.