



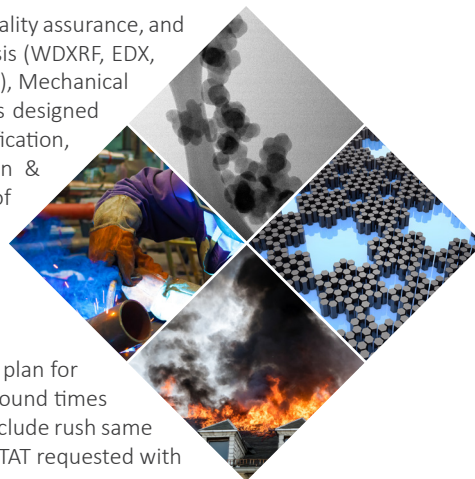
# MATERIALS SCIENCE TESTING

EMSL

EMSL Analytical, Inc. provides Environmental Chemistry Laboratory Services primarily at the Corporate Headquarters Lab in Cinnaminson, NJ but EMSL Analytical, Inc. provides a wide variety of materials testing, characterization, and forensic laboratory services at the Materials Science Lab in New Jersey and Salem, New Hampshire (Advanced MicroAnalytical). Our team includes Ph.D. scientists with substantial industry and academic credentials, and professionals with many years of experience in materials testing services.



Our team can design and implement testing programs, and offer solutions to challenges in manufacturing, quality assurance, and research and development. Using a broad array of instrumentation, we regularly provide Elemental Analysis (WDXRF, EDX, ICP, AA), Structural Analysis (XRD, NIR, FTIR), Microscopy Analysis (Light and Electron Microscopy SEM/TEM), Mechanical and Metallurgical Testing, and Particle Size and Distribution. The Particle Identification Analysis package is designed to cover multiple levels of complexity and includes Common Particle Identification, Full Particle Identification, and Unknown Material Identification. Additionally, we provide customized analyses for Contamination & Quality Control, Surface Analysis, Characterization of coatings and thin films, Failure & Forensic Analysis of manufactured devices and materials including electronics and semiconductors and polymer/composite materials, Electronics Packaging Failure, and Polymers Characterization to name only a few. Our capabilities allow us to quickly develop new methodologies to meet new industry challenges and client needs. We often function as “virtual resources” to our clients, complementing their own capabilities.



Our Materials Science Lab maintains a five-day operational hours schedule as well as emergency response plan for off hours and/or weekend operating hours. Samples are received during regular business hours and turnaround times (TATs) are tracked on business days from the time samples are received at the laboratory. The TATs offered include rush same day or next business day as well as 3 day, 4 day, 1 week, or 2 week. Costs/rates are weighted based on the TAT requested with our 2 week TAT rates being the most economically cost-effective for our customers.

Key tests include\* (but are not limited to) the following:

## MATERIAL IDENTIFICATION/CHARACTERIZATION

- Common Particle ID of large components such as fibers
- Full Particle ID of common indoor/outdoor contaminants
- Basic Materials Identification of solid components
- Advanced Materials Identification of all components (solid and liquid)

## COMBUSTION-BY-PRODUCTS

- NIOSH 5000-Carbon Black, Black Carbon/Soot, Wildfires and Residential Fire Debris, Source Confirmation

## COMBUSTIBLE DUST

- Sample Characterization, Minimum Explosive Concentration (MEC), Minimum Ignition Temperature (MIE), Maximum Normalized Rate of Pressure Rise (Kst), Class II Testing

## PARTICLE SIZING

- Mechanical Sieve, Sonic Sieve, Microscopy, Dynamic Light Scattering (DLS), Zeta Potential, Pore Size Analysis

## PHYSICAL TESTING

- Compression, Tension, Torsion Flexure, Hardness, Unconfined Compression

## PETROGRAPHIC AND SOILS

- Full Petrographic Analysis, Soil Grain Size, Liquid and Plastic Limits, Soil Classification

## RoHS - RESTRICTION OF HAZARDOUS SUBSTANCES (by XRF, ICP, CVA, GC/MS)

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBBs)
- Polybrominated Diphenyl Ethers (PBDEs)

## OTHER COMMON METHODS/APPLICATIONS

- Microstructural characterization by electron microscopy (SEM/TEM) — grain structure, defects, boundary/interfaces, quantitative image analysis
- Thin films/coatings analysis by XRD, FTIR Raman, XRF, SEM

- Multi-layer thickness, stoichiometry, roughness, preferred orientation, depth profiling Metallurgical analysis by optical microscopy (OM) — microstructure, fracture mode, porosity, inclusion rating, volume fraction count.
- Microelectronics analysis—failure analysis defect and contamination identification, packaging and inspection services, X-Ray, C-SAM, SEM, CT
- Thermal analysis by DSC, TGA—characterization of polymer blends, polymer crystallization and degradation, glass and phase transition, melting temperatures, thermal stability, residual solvent levels
- Alloy Characterization
- Pharmaceutical products: USP testing
- Failure analysis—fractography, corrosion, material evaluation, manufactured materials/devices, electronics and semiconductors
- Forensic analysis—product integrity, chemical identification, residual analysis
- Product evaluation and comparison—compliance, conformance, performance.
- Method development and validation.
- Explosive Residue EPA 8330A/B (17 common explosives)
- Surface Tension ASTM D1331
- GERMAN VDI3492 Asbestos and Fibrous Glass by SEM
- Asbestos-Free Validation Used for Talc Mines etc. (PLM, SEM, TEM, XRD)
- Paint Identification: ID the Type of Paint, Fillers, Pigments
- Integrated Circuit Support: including Focused Ion Beam-SEM/TEM 3D X-Ray Micro and Nano CT, Inspection Services
- Cleaning/Remediation Confirmation
- Weatherization aging studies
- Medical Devices Testing
- Process Validation
- Sample preparation—sectioning, grinding, electro- and ion polishing, cryo-milling, filtering, pressing, fusion, heat treatment.
- Consulting and expert witness services.
- Various ASTM, AATCC, ISO, NIOSH Methodologies (call for list)