



NanoLab Delivers!

Analytical Services

**Analytical Imaging
Non-Destructive Imaging
Chemical Analysis
Electrical Analysis
Circuit Edit**

MICROSCOPY & IMAGING

- 2-D X-ray Imaging - Real Time (RTX)
- 3-D X-ray Tomography
- Field Emission - Scanning Electron Microscopy (FE-SEM)
- Focused Ion Beam - Scanning Electron Microscopy (FIB-SEM)
- High Resolution Optical Microscopy
- Laser Confocal Microscopy
- Scanning Transmission Electron Microscopy (STEM)
- Transmission Electron Microscopy (TEM)
- Ultra High Resolution SEM (UHR-SEM)

MATERIALS CHARACTERIZATION - CHEMICAL & PHYSICAL

- 2-D X-ray Imaging
- 3-D X-ray Tomography
- Analytical Transmission Electron Microscopy (AEM)
- Electron Energy Loss Spectrometry (EELS)
- Electron Spectroscopy for Chemical Analysis (ESCA)
- Energy Dispersive Spectroscopy (EDS, EDX)
- Field Emission - Scanning Electron Microscopy (FE-SEM)
- Focused Ion Beam - Scanning Electron Microscopy (FIB-SEM)
- High Resolution Digital Optical Microscopy
- Laser Confocal Microscopy - Near-Infrared (SOM)
- Scanning Transmission Electron Microscopy (STEM)
- Secondary Ion Mass Spectrometry (SIMS)
- Ultra High Resolution Sem (UHR-SEM)
- X-Ray Photoelectron Spectroscopy (XPS)

ELECTRICAL FAILURE ANALYSIS (E-FA)

- Analytical Probe Station
- Curve-Trace - Manual & Automated
- Emission Microscopy - Near Infrared (EMMI)
- Fluorescent Micro-Thermal Imaging with Lock-In (FMI)
- Laser Stimulation Microscopy - Near Infrared
- Scanning Optical Microscope (SOM) - Backside
- Time Domain Reflectometry (TDR)

PHYSICAL FAILURE ANALYSIS (P-FA)

- 3-D X-ray Tomography
- C-Scanning Acoustic Microscopy (C-SAM)
- De-Capsulation
- Deprocessing
- FIB - SEM Cross Sectioning
- Field Emission - Scanning Electron Microscopy (FE-SEM)
- Mechanical Cross-Sectioning
- Parallel Lapping
- Real Time 2-D X-ray Imaging (RTX)
- Scanning Acoustic Tomography (SAT)
- Wet Chemistry - Strong Acids, Bases

BUNDLED SERVICES for FAILURE ANALYSIS

- LEVEL I
Non-Destructive, Curve Trace, Failure Verification, External Inspection, Internal Optical Inspection, C-Scanning Acoustic Microscopy, 2-D Real Time X-ray, De-Cap, TDR
- LEVEL II
LEVEL I Plus - Fault Isolation, Advanced Electrical Testing - Non-Destructive
- LEVEL III
LEVEL I & II Plus - Deprocessing, Cross Sectioning, Advanced Microscopy, Materials Characterization, 3-D X-ray Tomography

SAMPLE PREPARATION and ANALYSIS Per Request

- Argon Ion Milling
- Competitor Analysis
- Construction Analysis
- Counterfeit Analysis
- De-Capsulation (De - Cap)
- Diamond Milling - Backside / Frontside Sample Prep
- Dimpling
- Focused Ion Beam - Circuit Edit (FIB - Circuit Edit)
- Plasma Cleaning
- Preparation for TEM / STEM / FIB-SEM
- Reactive Ion Etching (RIE)
- Buehler Center of Excellence

CIRCUIT EDIT

- Single Beam FIB (Back-Side and Top-Side)
- Single Beam FIB (Plasma Beam)
- Single Beam FIB (Top-Side with Gases)

MANAGED SERVICES - NANOLAB PARTNERS

- Atomic Force Microscopy (AFM)
- Auger Electron Spectroscopy (AES)
- Fourier Transform - Infrared Spectroscopy (FT-IR)
- Gas Chromatography - Mass Spectrometry (GC-MS)
- Glow Discharge - Optical Emission Spectrometry (GD-OES)
- Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES)
- Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)
- Laser Ablation - Inductively Coupled Plasma - Mass Spectrometry (LA-ICP-MS)
- Laser De-Capping
- Raman Spectroscopy
- X-ray Diffraction (XRD)
- X-ray Reflectometry (XRR)
- Wavelength Dispersive - X-ray Fluorescence (WD-XRF)

**Analytical Services
On Demand**

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