Material Analyses

Organic and Inorganic Identification

Balazs™ NanoAnalysis provides comprehensive microcontamination support through chemical bond identification in conjunction with our expertise in material characterization and elemental analyses. These capabilities strengthen Balazs™ capabilities for surface, organic and inorganic analyses, testing of packaging materials, thermal analyses of polymers and extensive wafer analyses. Raman spectroscopy provides structural characterization of organic and inorganic materials. Particles as small as 0.7 µm can be evaluated.

Fourier Transform Infrared Spectroscopy (FTIR)

Molecular analyses of organic and inorganic materials

- Analyses of particles to 12 µm in diameter
- Characterization of thin films or bulk polymers, organic liquids or solids, crystalline solids, organic vapors, gases, lubricants, and adhesive materials
- Quantitative analysis with standards to monolayer levels
- Transmittance, reflectance and ATR modes of analysis
- 4000 cm^{-1} to 700 cm^{-1} range

Raman Spectroscopy

- Provides identification of closely related organic and inorganic materials
- Mapping capability to show distribution of contaminants

Parameter	FTIR	Raman
Applications	Analysis of passivation films Polymer and polymer additive characterization Thin organic film identification Analysis of solid, liquid and gas phase organic materials	Analysis of thin films Polymer and polymer additive characterization Analysis of organic contaminants Analysis of solid and liquid phase organic and inorganic materials Analysis of organic material in aqueous solution
Compounds/Elements Detected	Chemical bonds with dipole C-H, O-H, N-H, C=O, Si-O, C-F	Chemical bonds without dipole Si-Si, Si-C, C-C, C-H
Spatial Limits	12 µm spot	0.7 µm spot
Sensitivity	% to ppm	% to ppm

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UltraViolet /Visible Spectroscopy (UV/VIS)

- Electronic analyses of organic and inorganic materials
- Characterization of thin films or bulk polymers, pure organic liquids or solids, crystalline solids, organic vapors, aqueous solutions, lubricants, glasses, optics and adhesive materials
- Quantitative analyses with standards
- 190 nm - 1100 nm range

Gas Chromatography (GC and GC-MS)

- Separation and identification of volatile organic liquid and gaseous materials
- Characterization of thin films or bulk polymers (using pyrolysis or thermal desorption techniques), pure organic liquids or solids, organic vapors, aqueous solutions, lubricants, and adhesive materials (outgassing)
- Organic identification on wafers to <0.01 monolayer per SEMI MF-1982-1102 (previously known as ASTM F 1982-99EI)
- Quantitative analyses with standards
- Outgassing of polymers (IEST RP-CC031.2, IDEMA M-99)
- 10 - 800 amu mass range

Thermal Analysis (TGA, TMA, DSC)

- Characterization of the physical properties or thermal response of volatile and non-volatile solids or liquid materials
- Determination of melting points, boiling points, and phase transition temperatures (T_g).
- Thermal characterization of bulk polymers, pure organic liquids or solids, inorganic solids, lubricants, and adhesive materials
- Thermal expansion coefficients can be determined

Scanning Electron Microscope - Energy Dispersive Spectroscopy (SEM - EDS)

- Determination of surface morphology
- Characterization of surface elemental composition
- Mapping of elemental distribution, B - U
- Back-scattered electron (BSE) discrimination of Z contrast differences of surface
- Large 12” chamber
- Variable pressure to prevent

X-Ray Fluorescence (XRF)

- Screening of RoHS components
- Elemental detection to ppm levels
- Film thickness measurements

Laser Ablation ICP Mass Spectrometry (LA ICP-MS)

- Identification of unknown defects and materials with 85-element survey, Li - U
- Verification of composition stoichiometry of thin films, ppb to %
- Study of vertical elemental distribution in thin film materials

Glow Discharge Optical Emission Spectroscopy (GD-OES)

- Simultaneous multi-element depth profiling conductive and non-conductive coatings
- Verification of surface stoichiometry (<10 nm) after surface treatment
- Identification of interfacial impurities in multi layer stack
- nm to 150 µm depth profiles
- Light and heavier elements in a single run: H, Li, C, N, O to U
- ppm to %

Balazs™ NanoAnalysis operates ISO 17025 certified laboratories that identify, analyze and resolve contamination issues for high-tech industries around the world. The Microcontamination Experts™ at Balazs provide rapid and accurate analyses and expertise for water, air, chemicals, process gases, components, wafers, consumables and any other contamination sources.

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