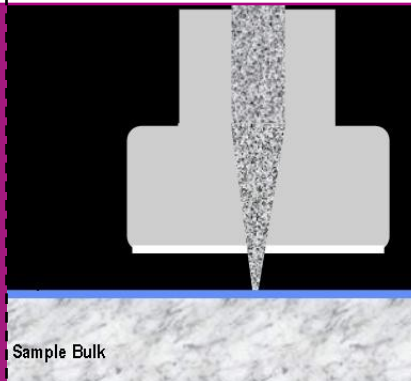


FTIR and Raman Spectroscopies



Identification and Quantification of Organics in Gases, Liquids and Solids

Vibrational spectroscopic techniques (Fourier Transform Infra-Red (FTIR) and Raman) may be utilized to identify and qualify bulk organic materials, thin films and micron sized features or defects. Trace level contaminants in gases or cleanroom air may be identified and quantified to ppbV levels in real time. Below is a summary of the use of vibrational spectroscopies for the identification of organic contaminants on solid surfaces.

FTIR Spectroscopy

This technique is one of the most useful tools for determination of organic contaminants in a variety of settings. Interpretation of FTIR spectra can identify the material in question and provides functional group information for characterization of a contaminant. FTIR spectra can be collected on gasses, liquids and solids.

Sample Features/Requirements

- Minimum sample spot size of 12 μm diameter
- Non-destructive analysis
- Large parts (up to 12" square, 1" thick)
- Transmittance or reflectance analysis
- Mapping, μATR and grazing angle accessories

Key Applications

Analysis of:

- Identification of organic liquids
- Polymer identification
- Contaminants on bond pads
- Backside die contaminants
- Bulk polymer samples
- Organic residues on solid surfaces (NVR)

Raman Spectroscopy

This technique is used to identify organic and inorganic materials on surfaces or inclusions in transparent materials and in solutions. Raman scattering spectra yield functional group information to allow for characterization of a contaminant and can identify the material in question. Raman spectra can be collected on gasses, liquids and solids at various temperatures.

Sample Features/Requirements

- Minimum sample spot size of 0.7 μm diameter
- Non-destructive analysis
- Large parts (up to 12" square, 1" thick)
- Reflectance (scattering) analysis
- Microprobe modes can be used to map surfaces

Key Applications

Analysis of:

- Identification of silicon phases
- Polymer identification
- Contaminants on bond pads
- Backside die contaminants
- Bulk polymer samples

A comparison of FTIR and Raman spectra of a silicon compounds highlights the strengths of the two techniques.

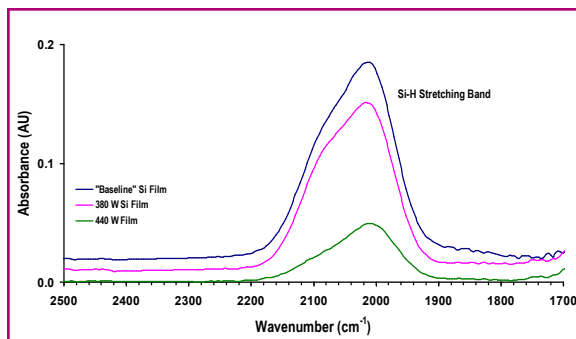


Figure 1. FTIR spectrum of a-Si film for determination of hydrogen content (via Si-H stretching band)

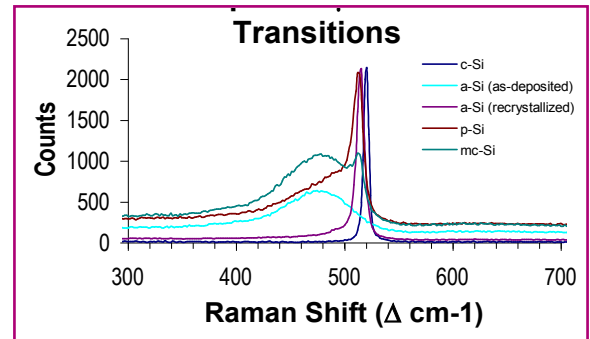


Figure 2. Raman spectra showing the conversion from a-Si film to c-Si film (single crystal Si is a reference)

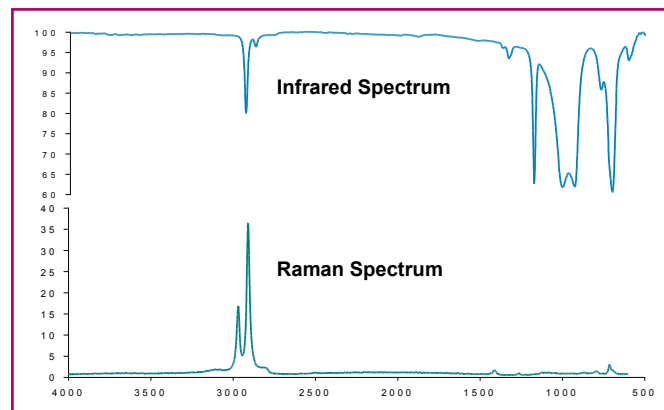


Figure 3. A comparison of Infrared and Raman spectra of a silicone compound