Diamond Vogel
INDUSTRIAL COATINGS

TECHNICAL BULLETIN

FTIR Microscope Analysis

What is FTIR?

FTIR stands for Fourier Transform Infrared. Fourier Transform (the FT in FTIR) is a complex mathematical conversion of the infrared signal that makes it suitable for interpretation. When infrared (IR) light is passed through a sample, some radiation is absorbed by the sample and some reflected. The resulting signal is a spectrum representing a molecular "fingerprint" of the sample. The usefulness of infrared spectroscopy arises because different chemical structures (molecules) produce different spectral fingerprints which can then be matched to known chemical spectra.

Strengths of FTIR

Analysis is rapid, just five minutes for solids and 10 minutes for liquids. FTIR is nondestructive, so a dried coating is almost unaffected by the analysis. Additional materials are being added to the library. The microscope allows the analysis of defects as small as 20µm. The depth of light penetration into a surface is about 0.65µm, making this a surface-level analysis. It is also possible to generate a chemical map of a surface. Diamond Vogel has a large coatings library used to match unknown coatings to known coatings in the library.

Limitations of FTIR

Only the basic system (resin and crosslinker) can be identified unless there is a near-perfect match in the instrument library. For example, a polyester coating is easily distinguished from an epoxy; however, two similar polyesters will look almost identical. The resin system will overwhelm any other materials in the coating. Fillers in a coating cannot be identified. Even materials like pigments at a 10% loading or less are difficult to detect.

Samples of FTIR Analysis

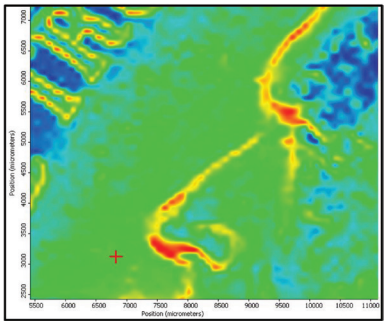
BEST

- Coated panels or parts
- Coated paper
- Film: transparent or opaque
- Viscous liquids

DIFFICULT

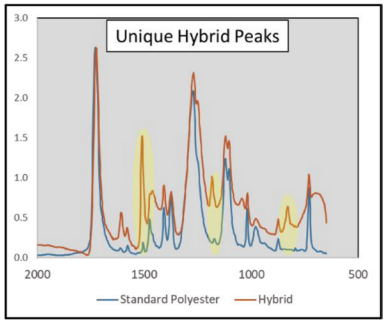
- Thin liquids
- Powders
- Very thin coatings
- Gases (not possible)

Illustrations



Chemical Map - Finger Oil on Nickel

FTIR Microscope



Example Spectra

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