MultiLoop-MIR™ FTIR Fiber Optic Probe:
Spectroscopy Outside the Box

This MultiLoop-MIR system is perfect for analyzing liquids, pastes, and soft solids outside of the FTIR spectrometer sample compartment. It is used in conjunction with the Harrick FiberMate2 or other fiber optic coupler and includes two fiber probes with a set of ten ATR loop tips. This combination is designed for spectral data collection across the entire mid-infrared region. To analyze a sample, simply dip the ATR loop tip into the sample or press it gently against the sample. The tips are easily replaced when needed.

APPLICATIONS

- Multiple reflection ATR (internal reflectance) accessory.
- In-situ analysis of a wide variety of liquids, pastes, and soft solids.
- Quantitative and qualitative analysis.

FEATURES

- Multiple reflection ATR sampling outside the FTIR spectrometer.
- Effectively provides two reflections when compared to ATR with ZnSe at 45º.
- Wavelength range: 6500 cm^{-1} to 600 cm^{-1}:
  - Chalcogenide glass probe for use from 6500 to 1700 cm^{-1}.
  - Polycrystalline Silver halide probe for use from 2000 to 600 cm^{-1}.
- Sampling loop tips designed for the full spectral range of 6500 to 600 cm^{-1}:
  - Dip into or press against the sample.
  - Leak-free for analysis of liquids.
  - Readily replaceable.
  - Made from silver halide fiber material.
- Easy to use.
- Suitable for aqueous solutions and organic samples.
- Standard probe length of 1meter allows sampling outside the spectrometer sample compartment.
- Designed for use with DTGS or MCT detectors.
- SMA connectors for easy connection to fiber optic couplers.
- Operable from room temperature to 100°C.
- Use with the Harrick FiberMate2™ or FiberMate™ fiber optic coupler for purged operation in most FT-IR spectrometers.

INCLUDES

- MultiLoop-MIR Mid-IR Set for the entire mid-IR
  - Silver Halide Probe.
  - Chalcogenide Probe.
  - Ten Silver Halide Tips.
- MultiLoop-MIR Silver Halide Probe Set (2000 to 600 cm^{-1})
  - Silver Halide Probe.
  - Five Silver Halide Tips.
- MultiLoop-MIR Chalcogenide Probe Set (6500 to 1700 cm^{-1})
  - Chalcogenide Probe.
  - Five Silver Halide Tips.

ORDERING INFORMATION

CATALOG NO.

MultiLoop-MIR Mid-IR Set	FOP2-MIR
MultiLoop-MIR Silver Halide Probe Set for use from 2000 cm^{-1} to 600 cm^{-1}	FOP2-PIR
MultiLoop-MIR Chalcogenide Probe Set for use from 6500 cm^{-1} to 1700 cm^{-1}	FOP2-CIR
FiberMate2 Fiber Optic Coupler	FM2-XXX*

**XXX indicates spectrometer make and model, Varian customers receive a different model. Please contact us for details.*

REPLACEMENT PARTS

Disposable CIR Loop Tips (set of 5)	FOP2-C05
Disposable PIR Loop Tips (set of 5)	FOP2-P05
Replacement cover kit (includes replacement fiber covers, etc.)	FOP2-PRT

Harrick Scientific Products, Inc.
141 Tompkins Ave, 2nd Floor, Pleasantville NY 10570
Ph: 800-248-3847 or 914-747-7202, FAX: 914-747-7209, web site: www.harrricksci.com, e-mail: info@harrricksci.com

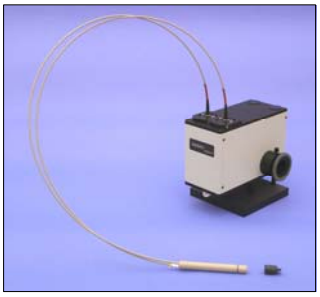

Figure 1. MultiLoop-MIR installed on the FiberMate2.

New fiber manufacturing techniques combined with the high performance of modern FTIR spectrometers now make it possible to offer a fiber optic system for use with the DTGS detectors that are standard with most FTIR spectrometers. This system allows data collection over the entire mid-IR.

This system, the MultiLoop-MIR, features two fiber optic probes with readily replaceable sampling tips. One probe operates over the fingerprint region, from 2000 to 600 cm^{-1}, while the second covers the remaining mid-IR, from 6500 to 1700 cm^{-1}. The probes connect to a fiber optic coupler, such as Harrick's FiberMate2, using standard SMA connectors. Probe tips are affixed onto the end of the probes to provide a leak-free probe assembly that can be dipped into or pressed gently into liquid, pastes, and soft solids. These tips are the only part of the MultiLoop-MIR that comes in contact with the sample, and they are easily replaced as needed.

The MultiLoop-MIR effectively provides two reflections from the sample compared to single reflection ATR at 45º with a ZnSe crystal. It has excellent throughput for infrared fiber optics, allowing data collection with a DTGS detector.

Several examples are shown below using the MultiLoop-MIR with the FiberMate2 (see Figure 2). For these measurements, the spectrometer set for 64 scans at 8cm^{-1} resolution. The entire mid-infrared spectrum was measured using the two fiber probes and tips. The chalcogenide probe was used for 4000cm^{-1} to 1520cm^{-1} and the silver halide probe for the 1530cm^{-1} to 600cm^{-1} region. The spectra were baseline corrected and joined together to show the full spectral range.

Figures 2 and 3 show spectra of three different liquids. The two children's analgesics shown in Figure 2 are clearly distinguishable from each other in the fingerprint region. The spectrum of a wine sample (Figure 3) shows characteristics from the organic component of the grapes, in additional to the strong aqueous bands.

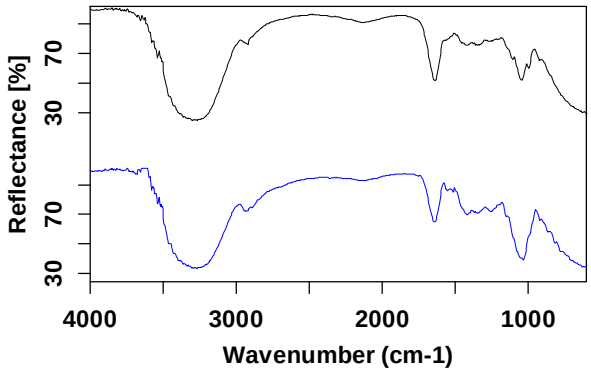

Figure 2. ATR Spectra of Children's Liquid Pain-Relievers Motrin (black) and Tylenol (blue).

Figures 4 and 5 demonstrate using the MultiLoop-MIR for solid sampling. The silicone rubber tape is soft and flexible, so good contact was readily obtained between the sampling tip and the tape, as shown by the strong band intensities. The peak intensities in Figure 5 are much weaker, indicating that the contact with this sample was not as good. Yet the spectrum is clearly identifiable as polyester. Note: pressing the sampling tip against solid samples reduces the lifetime of the tip and is only recommended for use with soft solids.

The MultiLoop-MIR provides a quick and easy method for quantitative and qualitative in-situ analysis of liquids, pastes, and soft solids within one meter of the spectrometer.

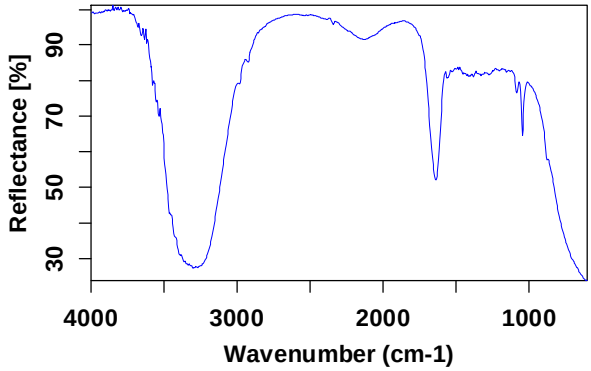

Figure 3. ATR Spectrum of Kouros White Wine.

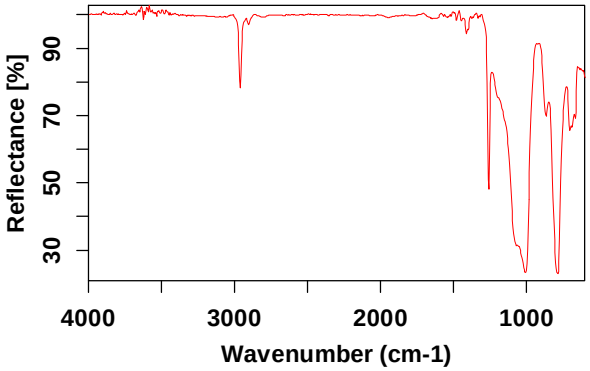

Figure 4. ATR Spectrum of Silicone Rubber Tape.

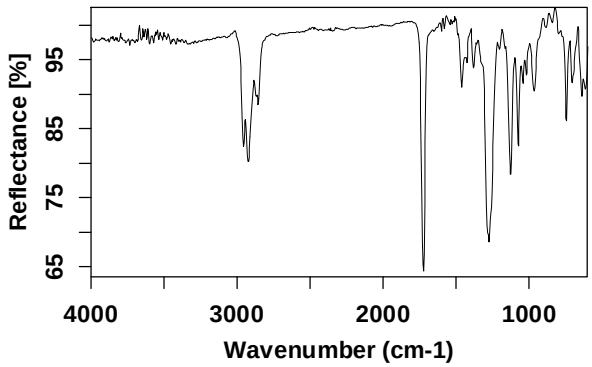

Figure 5. ATR Spectrum of a Plastic Toy Fish.