

# 4300 FTIR

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# BRING THE POWER OF FTIR SPECTROSCOPY OUT OF THE LAB... AND TO THE SAMPLE

**From improving composite bonding...  
to performance-testing of coatings...  
to verifying polymer identity and  
authenticity... to measuring metal surface  
contamination... success depends upon  
generating actionable, on-the-spot results.**

## **Perform accurate, non-destructive material testing with the Agilent 4300 Handheld FTIR**

The versatile, ergonomic 4300 Handheld FTIR is ideally suited to at-site, mid-IR measurement of objects constructed from high-value materials. Its optimized design lets you quickly scan large surfaces or areas, and knowledgeably assess factors such as identity, quality, authenticity, and wear. In addition, the 4300 Handheld FTIR enables you to analyze objects directly – without removing a sample – so you can reduce your dependence on overworked or off-site labs.

In short, the 4300 Handheld FTIR represents a new generation of FTIR innovation for material analysis brought to you by Agilent – the leader in developing handheld and portable FTIR analyzers.



**Superior analytical performance under real-world conditions:** The Agilent 4300 Handheld FTIR spectrometer eliminates the need to take samples to the instrument, so you can non-destructively measure objects of any size or form factor.

## GENERATE ACTIONABLE DATA FOR THESE AND OTHER APPLICATIONS

### Non-destructive testing, right on the spot

The 4300 Handheld FTIR enables you to take measurements *wherever they are needed* – regardless of the physical size or location of the object. It delivers immediate, real-time results to help you make informed decisions about factors such as quality control, surface contamination, and which samples require further testing.

You can non-destructively identify, verify, classify, authenticate, and detect counterfeits in a broad range of materials. We call this Positive Material Identification.

With handheld FTIR, you can perform in-service measurements to test materials during their lifetime and determine the affect of use and environment on wear characteristics.

In addition, the 4300 Handheld FTIR improves productivity by allowing you to quickly scan a large surface area and locate the most important measurement points.

### Remarkable comfort and superior data

Weighing under 5 lbs (2.2 Kg), the ergonomic 4300 FTIR is ideal for mobile measurements. But do not let its size fool you. The 4300 is *also* engineered with optimized electronics and an ultra-short internal optical path, so you can count on exceptional results for your most demanding applications.

Even better, the 4300 Handheld FTIR enables *anyone* to achieve reliable results with custom, easy-switch sample interfaces, zero-alignment optics, and intuitive software.



#### Aerospace, automotive, paints, and coatings

- Composites: Assess thermal, chemical, and environmental damage; test for curing; verify composition; and analyze surface plasma treatment
- Polymers: Verify composition and authenticity; detect contaminants; and test for curing
- Rubber and elastomers: Measure the composition of carbon-filled materials, such as tires
- Coatings: Confirm composition, thickness and uniformity; measure degradation; and ensure proper surface preparation



#### Food

- Measure soil composition and chemistry
- Analyze fruit and vegetable ripeness



#### Art and historical object conservation

- Confirm authenticity
- Analyze paints, pigments, fillers, and lacquers
- Determine paper and textile composition



#### Energy and Chemicals

- Identify engineering components (such as gaskets, seals and O-rings) by composition
- Monitor UV degradation of polymers used in solar panel arrays
- Identify and qualify films and coatings for critical applications in oil and gas exploration and handling
- Measure thermal damage and coating wear on composite wind turbine blades



#### Mining and geology

- Measure soil composition
- Analyze rocks, minerals and ores



#### Metals

- Ensure that surfaces are prepared for coating
- Measure surface contamination
- Monitor surface cleaning processes

# ENHANCED MATERIAL ANALYSIS FROM THE PEOPLE WHO DEVELOPED THE ORIGINAL HANDHELD FTIR

**More reproducible results:** At 5 pounds (2.2 Kg), the 4300 is comfortable to hold and use. It also has a perfect weight distribution with its batteries located in the base to balance the optical head. Optimized ergonomics means better quality results, especially for analyses that require longer measurement times, numerous measurement points, or are on objects that are physically constrained.

**Superior performance:** A proven interferometer design, ultra-short internal optical path, optically matched sample interfaces, and low-noise electronics yield better spectral data.

**The right detector for your application:** For routine analysis, our DGTS detector delivers broad spectral coverage. Our thermoelectrically cooled MCT detector is best for applications that require high performance and speed – and for acquiring numerous spectra over large surface areas.

**Rapid scanning:** The Agilent 4300 Handheld FTIR equipped with MCT detector is ideal for rapidly and conveniently mapping the surface of materials. The enhanced speed of measurement obtained with the MCT detector, combined with the rapid response software and the 4300's optimized ergonomics, make the analysis of numerous locations on a surface fast and easy.

**Real-time measurements:** Agilent MicroLab Mobile Measurement software was created and enhanced for our portable and handheld spectrometers. Its real-time spectral display complements the rapid scanning capability of the 4300 MCT system.





**Longer periods of continuous operation:** The lithium ion batteries that power the 4300 can easily be swapped while the system is running.



**Flexibility for every method:** Interchangeable, snap-on interfaces require no alignment, and are custom engineered to match optics and electronics. These interfaces are RFID equipped to ensure they are correctly matched to the specific method required for an analysis. You can also choose between two detectors: a DGTS detector for routine analysis, and a thermoelectrically cooled MCT detector for applications that require high performance and speed.



**Control at your fingertips:** An integrated touch screen operates all system and data acquisition functions and tilts for easy viewing in ambient light.



**Fast execution** of methods and commands with a simple trigger click.

Reliable field measurements, *when* and *where* you need them. Visit [agilent.com/chem/4300HandheldFTIR](http://agilent.com/chem/4300HandheldFTIR)

# MEET THE NEXT GENERATION OF FTIR MOBILITY

Touch-screen user interface runs the MicroLab Mobile software.

Flexibility for every method. Interchangeable, snap-on interfaces require no alignment, are custom engineered to match system optics, and are equipped with RFID sensors to ensure the correct match between sample interface and analytical method.


Easy trigger initiates method commands.

4-hour Li ion batteries: "hot" swappable for extended system use


Reliable field measurements *when and where* you need them.

Visit [agilent.com/chem/4300HandheldFTIR](http://agilent.com/chem/4300HandheldFTIR)







Advanced optomechanical and low-noise electronics with no alignment needed



Lightweight: just 4.8 lbs (2.2 Kg)



Balanced for easier, and better, measurements



Wrist strap improves comfort and security.

**Optically matched sample interfaces afford the highest-quality data for the broadest range of samples**



### **DIAMOND ATR**

Just right for solids, liquids, pastes, and gels, this interface consists of a diamond ATR sensor, which is impervious to corrosion and scratching. After samples come into contact with the diamond window, the top 2-3 surface microns are analyzed.



### **DIFFUSE REFLECTANCE**

Diffuse reflectance is best for samples that reflect little light, such as artwork, soils, rocks and minerals, composites, rough plastics, fabrics, and metal corrosion.



### **EXTERNAL REFLECTANCE**

External reflectance, with its 45° angle of incidence, is suitable for smooth, opaque samples that reflect infrared light. It also enables the analysis of thin films and coatings on reflective metal surfaces, such as aluminum and steel.



### **GRAZING ANGLE**

Ideal for sub-micron films, the grazing angle interface also works well for measuring trace contamination on reflective metal surfaces. Its 82° angle of incidence improves sample interaction with the infrared energy by increasing sample path length.



### **GERMANIUM ATR**

With germanium ATR, only the top 0.5 to 2 micrometers of an object are measured, making this interface a good match for strongly absorbing solids and liquids (such as carbon-filled elastomers and rubbers).

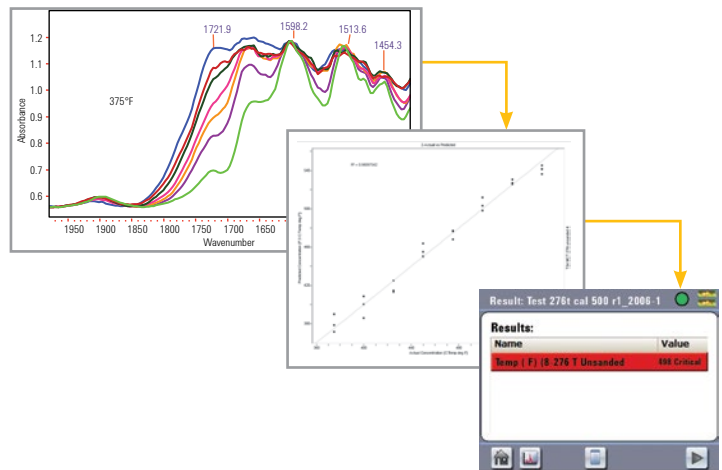
# MEASURE SMARTER, MEASURE FASTER FOR YOUR KEY APPLICATIONS

## The Agilent 4300 Handheld FTIR non-destructively handles field measurements across diverse industries

### Composites

The 4300 Handheld FTIR is proven to deliver outstanding results in applications such as:

- Detecting damage caused by excess exposure to heat
- Mapping thermal damage on surfaces
- Guiding sanding, scarfing, and patching repairs
- Measuring oxidative damage from UV light and other environmental factors
- Confirming the effectiveness of plasma treatment in preparing composite surfaces for bonding
- Detecting hydrocarbon and silicone oil contamination
- Assessing moisture levels
- Determining the extent of pre-preg curing
- Identifying and verifying composition



Composite thermal damage is represented in the MicroLab Mobile software. Behind the simple-to-use results screen, powerful calibrations embedded in the software provide a method specific to the analysis parameters. The result is color coded in red to show that the sample exceeds the critical threshold, indicating thermal damage.

### Polymers

With its versatile sampling capability, the 4300 FTIR enables you to:

- Identify, verify, and authenticate polymer components
- Measure the degree of cross-linking and cure
- Determine the composition of copolymers
- Analyze rubber and other elastomers – even those containing carbon particles
- Quantify phthalate plasticizer in polymeric materials used in consumer products
- Verify composition and authenticity of seals, gaskets, and O-rings
- Establish the identity and composition of carbon-filled polymers recycled from electronics



In the MicroLab method chosen for the pictured O-ring analysis, a threshold was set such that samples within the target group are shown in green while those outside the target group are shown in red. Furthermore, the conditional reporting feature can be used to display a customized alert message such as, "Confirmed FKM Type 1" for samples within the target group and the message "NOT FKM TYPE" for samples outside the target group.



## Coatings

From paints... to polymers... to adhesives... the 4300 Handheld FTIR lets you confidently:

- Confirm that underlying metal surfaces are clean and contaminant free
- Track the cleaning of contaminants from inorganic and organic surfaces
- Ensure that the correct coating has been applied to the finished product
- Test whether primers and coatings are properly cured
- Measure thickness and uniformity on metal surfaces
- Evaluate monolayer coatings for coverage and uniformity
- Monitor paint aging and weathering
- Identify lacquers, paints, and pigments used in art conservation and restoration
- Determine presence of residual solvent following coating cure



**Coating Identification:** Protective coatings are a key component to highly polished metal substrates used in lighting and other industrial applications. The 4300 Handheld FTIR can easily identify coatings, in support of quality control or incoming inspection objectives. Measurement of three commonly used protective coatings on polished surfaces (A) demonstrates that these materials are clearly distinguished by their mid IR spectrum. A library search (B) identifies one of the compounds as a silicone protective coating.



Reliable field measurements, *when* and *where* you need them. Visit [agilent.com/chem/4300HandheldFTIR](http://agilent.com/chem/4300HandheldFTIR)

# AGILENT MICROLAB MOBILE SOFTWARE

**For *any* application... Agilent MicroLab Mobile software is the perfect complement for the 4300 Handheld FTIR**

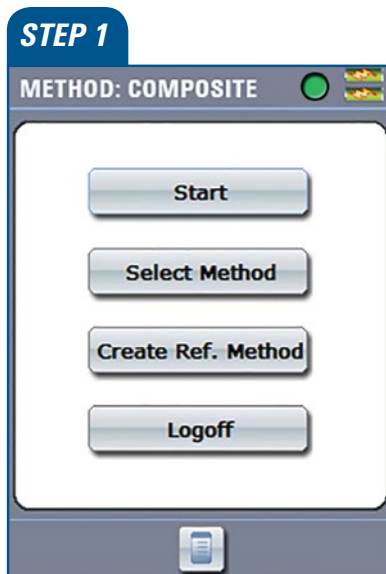


Powerful analytical capability, combined with an intuitive user interface, allows users of all levels to obtain great data in the field.

- Pictorial interface simplifies sample measurement
- RFID-enabled to optimize system acquisition parameters, and confirm that your sample interface and selected method are a match
- Real-time analysis mode and rapid scan rate make it easy to analyze the surface of an object, determine areas for more in-depth measurements, and develop a “molecular map” of the object’s surface
- Single-click trigger lets you execute methods quickly – including previously developed calibrations
- Full library search capability allows rapid identification, verification, and authentication
- Color-coded, visual alerts warn you when samples or objects are not within specification
- Automated diagnostics maximize your uptime
- Integrates easily with MicroLab PC software for easy data, methods, and libraries transference
- GLP/GMP compliant

## Visual, intuitive user interface and software enable rapid system implementation

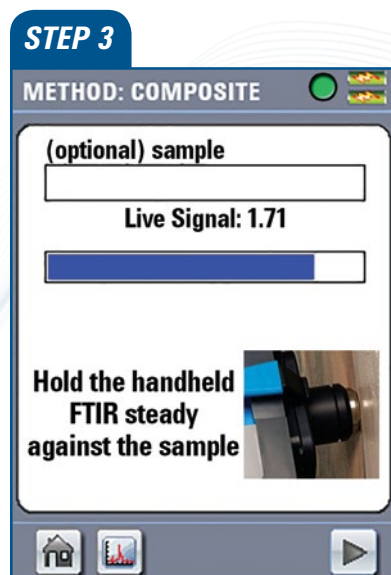
The highly acclaimed Agilent MicroLab Mobile software enables users of varied experience to get great results from the 4300 with a minimal training. The software guides the user through the measurement, and the RFID-equipped sample interfaces ensure that the method and measurement parameters are correctly matched. These innovations mean the 4300 will rapidly become an important part of your company's workflow.



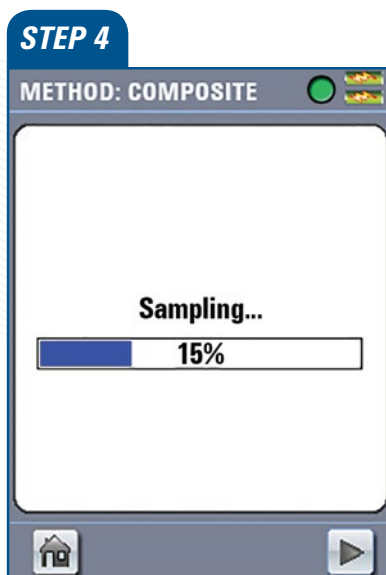
From the home screen you can quickly launch analysis, choose a method, and create a new reference method.



MicroLab Mobile Software will instruct when to position the spectrometer's sample interface on the object to be analyzed.



During sampling, the progress bar shows the advancement of the data collection.



When the progress bar reaches 100%, the prompt will change to Transferring Data. You can then remove the instrument from the sample.



**Results screen:** The results screen will display the calculated component values relative to their critical limits. Components within the acceptable range are shown in green.

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## More than 60 years of identifying and confirming both target and unknown molecules

**1947**

First commercial recording UV-Vis, the Cary 11 UV-Vis

**1954**

Release of the Cary 14 UV-Vis-NIR

**1969**

First rapid-scanning Fourier transform infrared spectrometer, the FTS-14

**1979**

First use of a mercury cadmium telluride (MCT) detector in a FTIR

**1982**

First FTIR microscope, the UMA 100

**1989**

Release of the acclaimed Cary 1 and 3 UV-Vis

**1999**

First 256 x 256 MCT focal plane array for analytical spectroscopy

**2000**

First ATR chemical imaging system

**2007**

Smallest, most rugged commercially available interferometer introduced

**2007**

Tumbler sample accessory introduced – a revolution in FTIR liquid sampling

**2008**

First handheld FTIR, the ExoScan

**2011**

The Cary 630 FTIR raises the bar for routine analysis of solids, liquids, and gases

**2014: Next-generation, 4300 Handheld FTIR introduced**

### For more information

Learn more

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