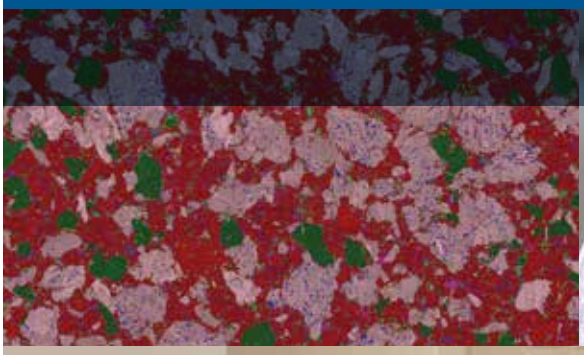
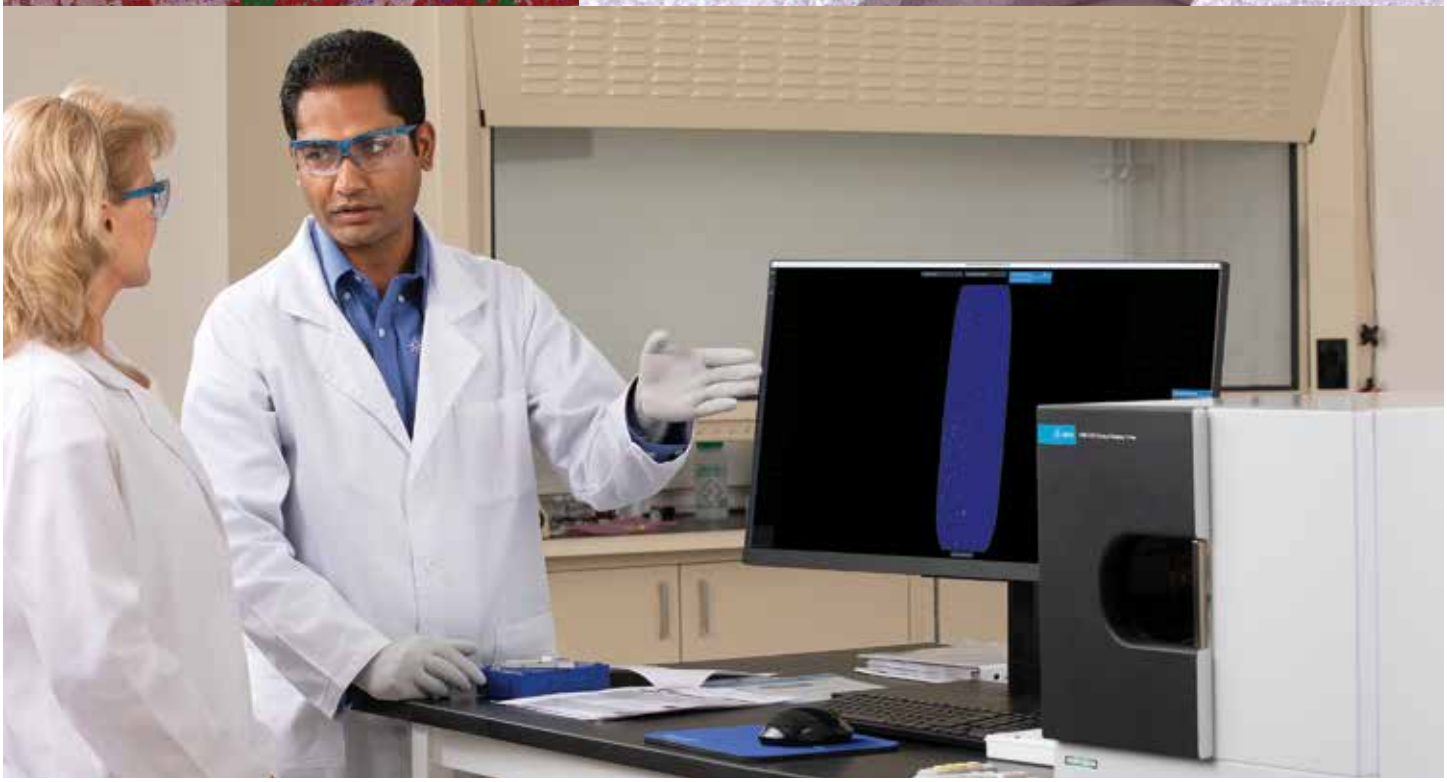
Agilent

Trusted Answers

Agilent 8700 LDIR Chemical Imaging System

Bringing Clarity and Unprecedented Speed to Chemical Imaging.





What if you could save time and achieve better results?

The Agilent 8700 Laser Direct Infrared (LDIR) chemical imaging system provides a sophisticated new approach to chemical imaging and spectral analysis. Designed to be used by both experts and nonexperts alike, the 8700 LDIR provides a simple highly automated approach for obtaining reliable high-definition chemical images of constituents on a surface.

The 8700 LDIR uses the latest Quantum Cascade Laser (QCL) technology coupled with rapidly scanning optics to provide fast, clear, high-quality images and spectral data. This technology is combined with intuitive Agilent Clarity software, for rapid and detailed imaging of large sample areas with minimal instrument interaction via a simple load and go method.

Using the 8700 LDIR, you can analyze more samples, in greater detail, in less time. This robust solution provides you with more statistical data than ever to aid in the compositional analysis of tablets, laminates, tissues, polymers, and fibers. With more meaningful information available, you can make more informed, faster decisions in product development reducing both costs and analysis time.

(From Left to right) Agilent Sample Planer, Agilent 8700 LDIR chemical imaging system and Agilent Clarity software analysis window

LDIR Spectroscopy – How it works

The 8700 LDIR works in either reflectance or Attenuated Total Reflectance (ATR) mode, automatically switching between these two modes by directing the incident beam to the appropriate objective. The movement of the sample relative to the beam is fully automated. The 8700 LDIR has two visible channels: a large field of view camera to obtain an entire view of the sample and a microscope grade objective to capture high magnification detail.

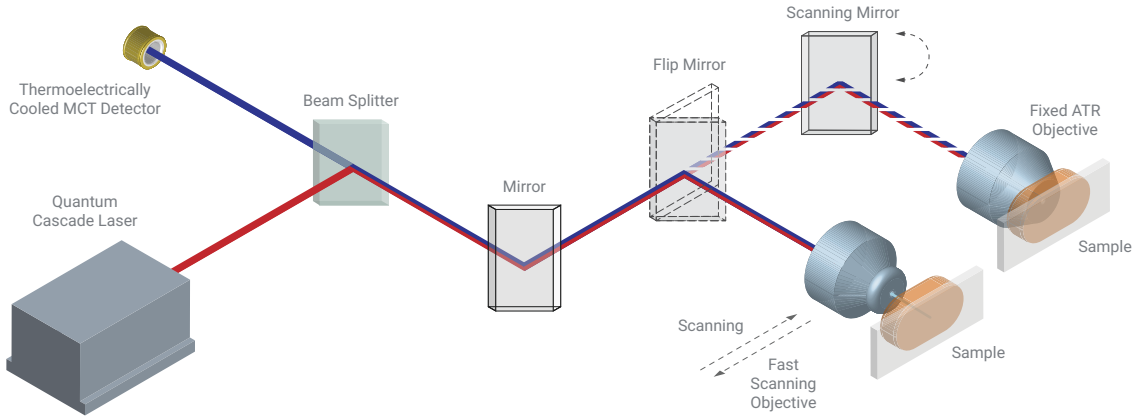


Figure 1. 8700 LDIR instrument optics

Infrared light from the QCL (shown in red) is directed to the sample. Infrared light reflected by the sample is then directed to the detector via either of the selected optical paths (shown in dark blue).

In reflectance mode (solid line), infrared light from the laser is focused by the fast scanning objective system that is rapidly scanned back and forth. Concurrently, the sample is automatically moved in a perpendicular plane, and the infrared light reflected by the sample is directed back to the thermoelectrically cooled mercury cadmium telluride (MCT) detector. This process yields a high-quality two-dimensional molecular image in a remarkably short time period.

In ATR mode (dashed line), infrared light from the laser is directed onto a scanning mirror that rapidly moves the light across the fixed ATR element, which is in contact with the sample. Totally internally reflected light is directed to the thermoelectrically cooled MCT detector.

The key benefits

- Automated sample analysis.
- Ability to survey large sample areas and then explore smaller areas of interest in more detail without changing any optics.
- Full software control allows changing the field of view from microns to centimeters or the pixel size from 1 to 40 µm.
- Acquire ATR imaging data with pixel size as small as 0.1 µm for unmatched image detail and spectral quality.
- Rapidly identify unknowns using either commercial or custom libraries via ATR capabilities.
- Obtain relative quantitative information of sample constituents without complex method development.
- No requirement for liquid nitrogen reduces operating costs and simplifies maintenance.

The Agilent 8700 LDIR Chemical Imaging System handles both your routine and challenging applications

The 8700 LDIR is suitable for a range of applications including pharmaceutical, material science, polymer analysis and life science research.

Pharmaceutical

- Tablet content distribution – image the spatial distribution of Active Pharmaceutical Ingredients (APIs) and excipients to ensure consistency, quality, and to aid in formulation development and troubleshooting.
- Investigation of factors affecting polymorphism, crystallization and salt exchange.
- Analysis of multi-layer tablets – monitor inter- and intra-layer consistency.
- Analysis of single and multilayer coatings for consistency.
- Correlation of drug formulations (chemical and physical structure) with dissolution studies.
- Identification of extraneous particles and impurities.
- Counterfeit drug analysis – create spectral and image databases of drug tablets to support anti-counterfeiting efforts.

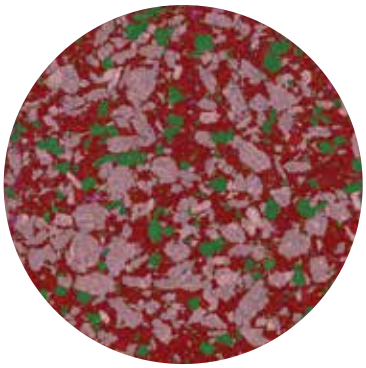


Figure 2. A high spatial resolution chemical image of a generic headache tablet consisting of three APIs (acetaminophen, aspirin and caffeine) and four excipients. All seven components were imaged across the entire tablet (11 mm diameter) with 10 micron pixel size in only 1 hour.

Accelerate pharmaceutical drug development

In the pharmaceutical industry, time is a critical factor when releasing products. Problems that arise during drug formulation take time and resources. With the 8700 LDIR, an entire tablet can be quickly and easily analyzed, speeding up your troubleshooting process.

Formulation and batch release testing are complex and critical processes. In addition, consistency is required, batch after batch. The 8700 LDIR system provides high sensitivity chemical composition analysis. With this system, you can now quickly and easily obtain qualitative and semi-quantitative information about APIs (polymorphs, salts), excipients, and impurities.

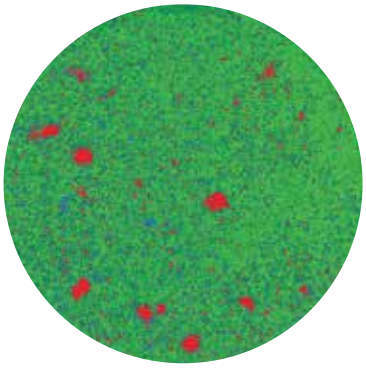


Figure 3. Polymorph analysis
Carbamazepine form I (red) form III (blue)
The 13 mm tablet was analyzed in 27 minutes at 10 µm pixel size.

Biomedical/Life science research

- High-quality imaging and infrared spectra of cells, tissues, cartilage, bone, and other biological materials.
- Rapidly survey specimens to find and then interrogate areas of interest.
- Analysis of biopolymer surfaces to further understand activity and support quality assurance.
- Find and identify defects, impurities, and extraneous particles in biopolymer matrices.

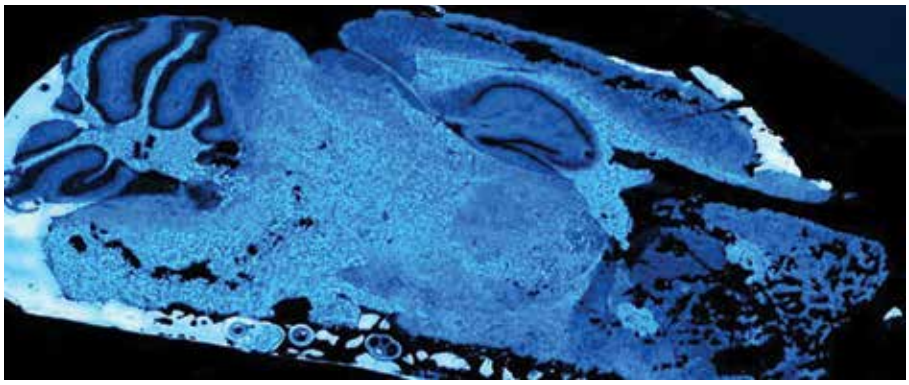


Figure 4. A chemical image of a mouse brain slice showing lipid distribution (12mm x 7mm) at 1 µm pixel measured in 1 hour.

Materials science/polymer analysis

- Packaging/laminates analysis – rapidly image and determine layer identity and thickness for functional and tie (adhesive) layers, down to ~ 3 µm.
- Rapidly identify defects within polymers and multilayer films.
- Analysis of extraneous surface particles and impurities on materials including semiconductors and electronic components.
- Determine and identify the authenticity of components.

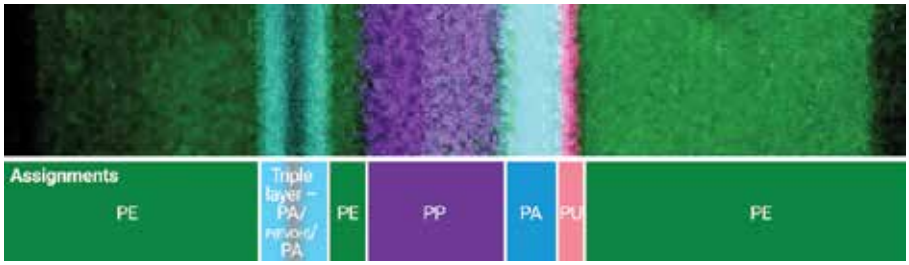
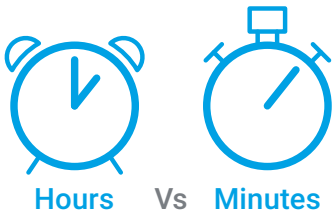


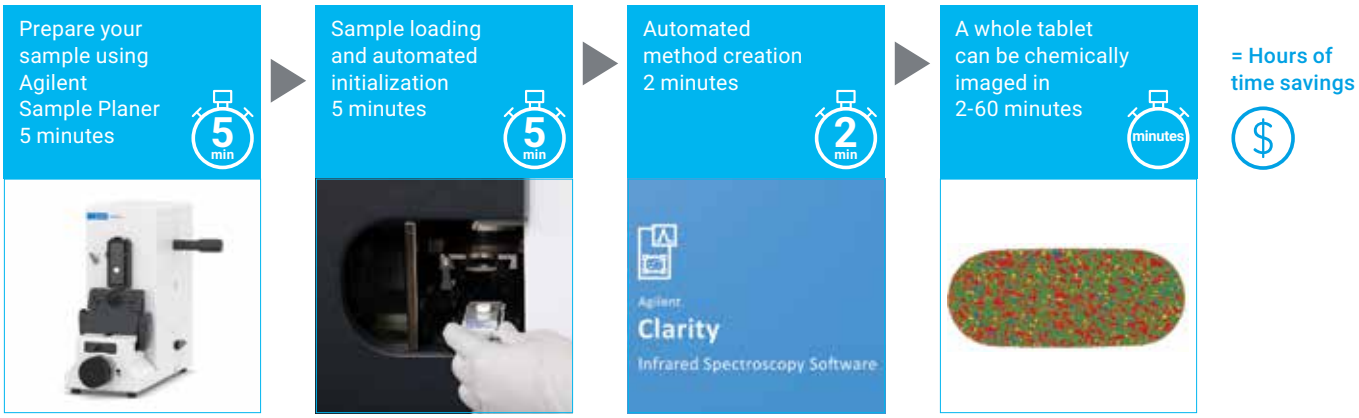
Figure 5. A chemical image showing layers of the laminate sample (120 µm width) consisting of polyethylene (PE), polyamide (PA), poly (ethylene vinyl alcohol) (P(EVOH)), polypropylene (PP) and polyurethane (PU). The thinnest layer observed was only 2.6 µm thick.

Automated. Intuitive. Fast.

Sample preparation and automated analysis is now accessible

The instrument control and software tools of the 8700 LDIR allow both expert spectroscopists and trained technicians to analyze and characterize samples rapidly and accurately. Simply load the sample in the instrument and allow Agilent's Clarity software to reveal complex statistical data in a rapid and intuitive manner.





Breakthrough IR Technology

Agilent's innovative design uses Quantum Cascade Laser (QCL) light, high spatial imaging, and intuitive Agilent Clarity software to create detailed chemical images. Unlike other QCL imaging systems that use 2D Focal Plane Array (FPA) detectors, the 8700 LDIR employs a single-element electrically cooled detector to eliminate laser coherence artifacts from images and spectra.

Agilent Clarity software

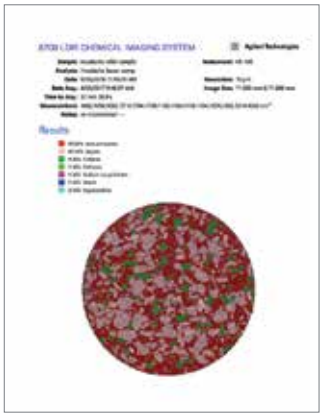
Redefining chemical imaging software

Innovative Agilent Clarity software, built from the ground up and designed with the user experience at the forefront, is simple and easy to use. This intuitive visualization software facilitates complex data interrogation and reporting.

The software totally redefines the chemical imaging software user experience by providing high spatial resolution compositional analysis together with spectral library matching.

Key software analysis features include:

- Fast, easy method creation.
- Spectral analysis including mathematical functions (e.g. variance, addition, averaging) and spectrum transformations.
- Create and search libraries which enables compound identification.



Simple report generation

Agilent Sample Planer

The Agilent Sample Planer is used to prepare samples for analysis using the Agilent 8700 LDIR Chemical Imaging System. Preparing a flat surface has never been easier.

- Prepares flat sample surfaces.
- Simple manual adjustment to control sample thickness.
- Requires no power supply enabling portability.
- Maintenance free.

Learn more:
www.agilent.com/chem/8700-ldir

Buy online:
www.agilent.com/chem/store

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