

AUTOMATED ACCESSORY

AutoATR – An Innovative Breakthrough in Automated ATR Sampling



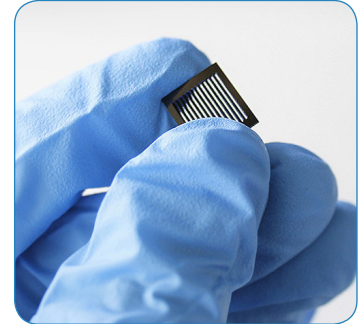
FEATURES

- Complete hardware and software package for automated ATR analysis
- Up to 24 unique ATR measurements in a single run
- Spectra comparable to a single reflection ZnSe or diamond ATR
- Removable and replacement ATR elements
- Fully enclosed, purgeable design with front-loading tray
- In-compartment mounting, compatible with most FTIR spectrometers

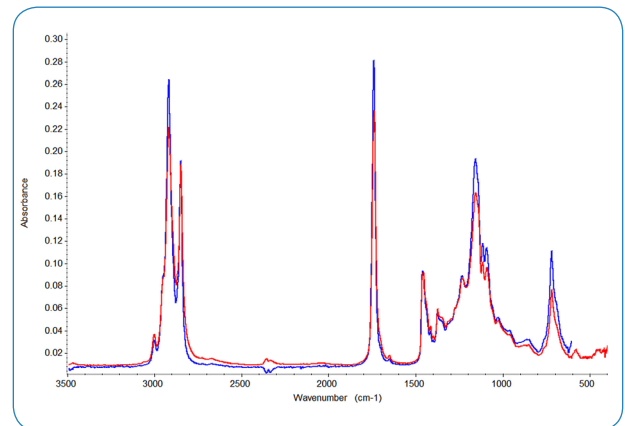
The development of an automated attenuated total reflection (ATR) accessory on a non-micro scale has been elusive despite ATR being the most popular mid-IR sampling technique due to its ease-of-use and small fixed pathlength. The primary advantage of FTIR-ATR measurements is minimal sample preparation. However, cleaning of the ATR crystal after every measurement is mandatory and has hindered the development of a commercial automated ATR in the past. With new innovations these challenges have been met and the advantages of automation are realized with the introduction of the AutoATR by PIKE Technologies. This new sampling accessory greatly enhances productivity of large-scale studies and facilitates routine measurements for high-throughput labs. The accessory is suitable for making ATR measurements of liquids, gels, pastes, casted films and more.

The AutoATR merges an exciting new ATR crystal developed via microtechnology with a microtiter plate platform offering precision mechanics and automated software control. Using a 24-well microtiter plate format enables 24 unique ATR measurements to be conducted within one run. At the heart of this accessory is a single reflection ATR crystal made from 500- μm thick silicon functionalized with multiple microprisms, which couples the light into the crystal. The dimensions of an individual crystal are 9 mm x 11 mm; the ATR active area is 7 mm x 9 mm. Each 24-well plate consists of 24 individual and removable Si ATR crystals.

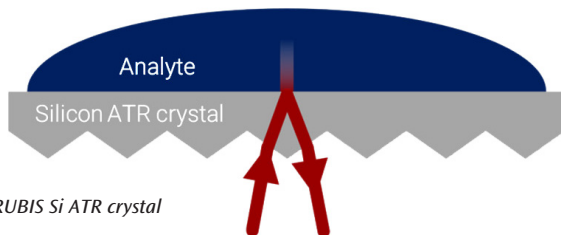
Silicon, in this thin 500- μm form, is an ideal multipurpose ATR element. It has an extremely inert sampling surface and is suitable for use with substances having a pH between 1-12. The changeable ATR crystals also offer the opportunity to store the samples and to prepare different samples at the same time (i.e. drying). In addition, the plain silicon surface may be functionalized outside the microplate, because the crystals are removable and interchangeable.



For traditional Si ATR crystals, the beam pathlength through the crystal is several millimeters in some cases, which results in complete absorption of the Si phonon bands in the fingerprint region (1500 – 400 cm^{-1}). The beam pathlength through the thin profile of Si ATR element minimizes absorption from Si phonon bands and offers a full mid-IR spectral range (5000 – 400 cm^{-1}). The absorbance and penetration depth are comparable to a standard diamond ATR. The figure below shows spectra of oil collected using the AutoATR versus a single reflection diamond ATR. Absorbance band position, shape and magnitude are very similar. The efficiency of the accessory's delivery optics and Si ATR element coupled with several microprisms results in high energy throughput and reproducibility. Thus, high-quality spectra may be collected over a short time period.



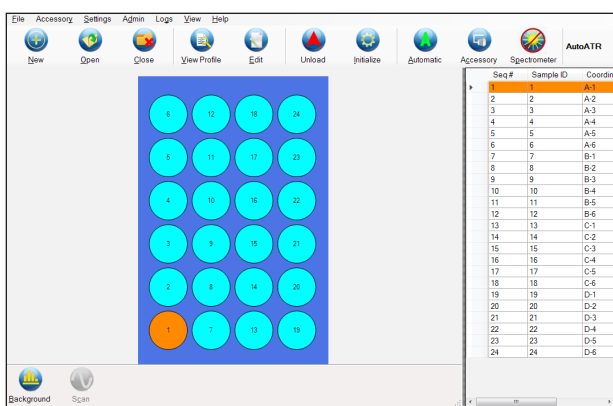
Spectra of oil collected using the AutoATR (red) and a single reflection diamond ATR (blue).



IRUBIS Si ATR crystal

The AutoATR is designed to fit into the sample compartment of most FTIR spectrometers. Its X,Y tray moves to a position outside the accessory for easy loading and unloading of samples while maintaining purge. The stage is driven by precision servo motors with optical encoders for speed and reproducibility. USB and DC power are the only external connections required. The optical design is based upon a precision ellipsoidal reflector, which has been diamond turned for optimal performance. The optics demagnify the beam to a size that fills the active ATR area.

The accessory's control software, AutoPRO, plays an integral role in its usability and value. Data collection is enabled through communication with most FTIR software programs. It allows for traceability by facilitating multiple users. Sample descriptions may be entered manually or uploaded from a spreadsheet; sample information is stored with the spectral file. For ease of file finding, the program offers numerous file naming schemes such as time stamp or unique file prefix naming. It also incorporates options for calling macros to execute post-processing commands such as peak picking, report generation and exporting data to a spreadsheet format.



PIKE AutoPRO software configured for the AutoATR accessory.

The AutoATR high-throughput accessory is ideal for comprehensive larger studies. Fields of biology, medical, pharmaceutical and food could benefit from an automated ATR. Additionally, there are ongoing efforts to transfer infrared spectroscopy from academic research into clinics. An automated ATR high-throughput device fulfills this requirement and enables larger studies, while increasing lab efficiency and minimizing workforce requirements, and also is suitable for the high throughput lab conducting routine measurements.

SPECIFICATIONS

Optics	Elliptical – 3X beam demagnification
Accuracy	+/- 25 μ m
Mechanical Specifications	
Repeatability	+/- 5 μ m
Resolution	1 μ m
Minimum Run Time	56 seconds for 96-well plate (actual time is spectrometer and application dependent)
Computer Interface	USB
Dimensions (W x D x H)	6.25 x 13.2 x 5.55" (including micrometer)
Weight	10 lbs

ORDERING INFORMATION

PART NUMBER DESCRIPTION

047-25XX AutoATR
Includes AutoPRO software, 24-well ATR plate with ATR elements

Notes: Replace XX with your spectrometer's Instrument Code. [Click for List >](#)

REPLACEMENT PARTS AND OPTIONS

PART NUMBER DESCRIPTION

162-4810 AutoATR 24-well Plate with ATR Elements

162-4812 AutoATR 12-well Plate with ATR Elements

162-4814 AutoATR Replacement ATR Elements (2 ea.)