



THE SEAGULL™

The Seagull™* is a powerful attachment for examining numerous types of samples using a variety of reflection techniques. This unique accessory can be easily adapted for external, internal or diffuse reflection spectroscopy. In addition, it can be operated over a broad range of incident angles without misaligning the system, without defocusing the incident radiation, and without changing the polarization of the incident beam. This makes the Seagull™ extremely versatile and flexible. The Seagull™ also incorporates Harrick's PermaPurge™ feature which permits changing the angle of incidence without interrupting the purge of the spectrometer.

APPLICATIONS

- ▶ Variable angle external and internal reflectance.
- ▶ Ideal for examining a wide variety of samples, including powders, optical coatings, opaque substrates, films on opaque substrates, and slightly curved solids.
- ▶ Excellent tool for studying liquids and films on liquids by external reflectance, for depth profiling, and for determining optical constants.

FEATURES

- ▶ Multi-purpose, variable angle reflection attachment.
- ▶ Internal, external, and diffuse reflectance capabilities.
- ▶ Continuously variable angle of incidence, from 5° to 85°.
- ▶ Focuses the incident beam on the sample for all incident angles.
- ▶ Always centers the incident beam on the same area of the sample.
- ▶ Maintains polarization for angles.
- ▶ No realignment of the accessory or repositioning of the sample required when varying the incident angle.
- ▶ High optical throughput.
- ▶ PermaPurge™ permits changes in angle without interrupting the purge of the system.
- ▶ Ming-Sung™ ATR Rotator for studying oriented polymers available separately.
- ▶ Convenient liquid, powder, and heated sampling accessories available.



HEMISPHERES	
Material	Catalog No.
Ge	EJ6XBB
ZnSe	EM6XBB
Si	EE6XBB

INCLUDES

- ▶ Sample holder for external reflectance with a sample cup for diffuse reflectance.
- ▶ Sample pressure plate.
- ▶ Mating hardware for the specified spectrometer.
- ▶ Alignment mirror.
- ▶ Optional compatible polarizer and ATR kit available.

*Patented

ORDERING INFORMATION

CATALOG NO.

Seagull™	SEA-XXX
Seagull™ Research Package (includes Seagull™, internal reflection kit, wire grid polarizer, and SOS™ software)	SRP-XXX
OPTIONS	
Flow-Through Liquid Cell	SEA-FLC
ATR Kit (includes ZnSe hemisphere and holder, pressure plate, and clamp)	IRK-SEA
Ming-Sung™ ATR Rotator (includes holder with calibrated dial for setting the angle, pressure plate and clamp)	MNP-SEA
Powder Sample Holder	SEA-PSH
SOS™ Software Package	SOS-102
Torque Screwdriver	PTW-SXX
Trough Liquid Cell	SEA-TLC
Two Position Wire Grid Polarizer, KRS-5 Substrate	PWG-SEA
Heatable Flow-Through Liquid ATR Cell, 24V	SEA-HLC-3
Heated Sample Stage, 24V	SEA-HOT-3
Automatic Temperature Controller, 24V output, 110V input	ATC-024-1
Automatic Temperature Controller, 24V output, 220/240V input (CE marked)	ATC-024-2

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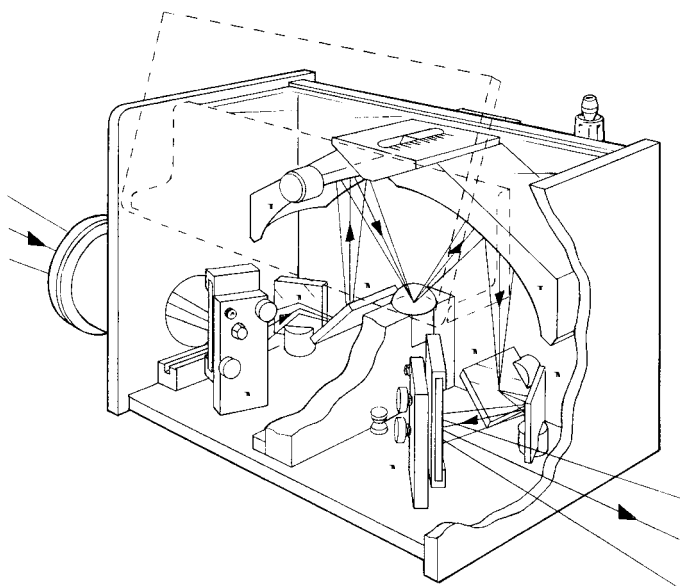


Figure 1. The Seagull™ variable angle reflection attachment.

Variable angle reflection spectroscopy is becoming increasingly important. Certain samples such as powders, opaque substances, films on opaque substrates, and films on liquids are tedious or practically impossible to analyze with conventional transmission spectroscopic equipment. The analysis of such samples with reflection spectroscopy, however, is straightforward.

The Seagull™ is shown in Figure 1. Three mirrors (M1, M2, and M3) direct the beam to an ellipsoid (E1) that focuses the beam onto the sample. The sample reflects the light onto a second ellipsoid (E2). Ellipsoid E2 reflects the beam from mirrors M4, M5, and M6 onto the detector of the spectrometer. Mirrors M3 and M4 are coupled to rotate together, in mirror image fashion. This directs the beam to and from different portions of the ellipsoids, changing the incident angle of the beam on the sample. This configuration automatically preserves the optical alignment for any selected angle of incidence.

The Seagull™ is ideal for examining surface and optical coatings, for measuring optical constants, and for liquid or electrochemical analysis with the appropriate cells. Sampling accessories are available for convenient sampling of a variety of types of samples.

For ATR studies, the Seagull can be equipped with our Internal Reflection Kit (SEA-IRK). This kit includes a ZnSe hemispherical ATR crystal mounted in a holder that slides into the Seagull in place of the specular reflectance holder. The holder has a built-in pressure applicator. The kit also includes a compatible pressure plate.

For specular reflectance of liquids, the trough liquid (SEA-TLC) cell provides an open reservoir to contain the sample. The trough readily mounts onto the standard specular reflectance holder.

For heated studies, a sample stage (SEA-HOT) is available that can be heated to 150°C. This stage can be used to support samples for either ATR or specular reflectance measurements.

For ATR studies of liquids, a flow-through liquid cell (SEA-FLC) is offered. This cell is equipped with two luer ports and seals against the ATR crystal with an o-ring. The cell can be used for both flow-through measurements and for applications requiring a sealed liquid cell. A temperature-controlled version of the cell (SEA-HLC) is also available for examining liquids from room temperature to 150°C.

For ATR measurements of powders, a convenient powder holder (SEA-PSH) is available. This holder provides a spring-loaded removable cup that minimizes spillage of the sample while optimizing contact with the ATR crystal.

For studying oriented polymers and determining ordering in systems with molecules on inorganic surfaces, our Ming-Sung™ ATR Rotator (MNP-SEA) is available. This rotator is a specially designed crystal holder that permits a 0° to 90° rotation of the sample without dismounting the sample. It is compatible with the hemispheres that can be purchased separately or with the Internal Reflection Kit.

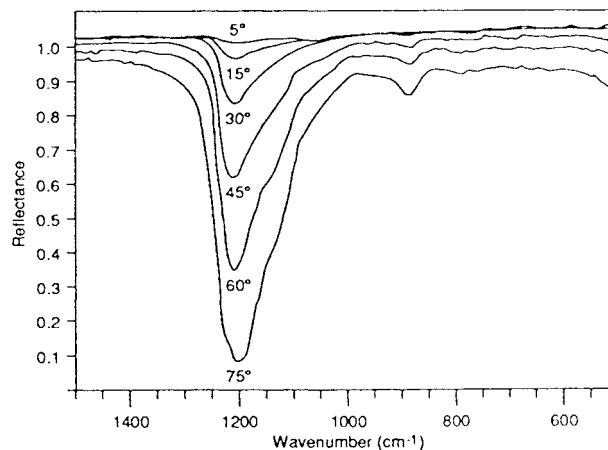


Figure 2. External reflectance of 0.05 μm SiO_2

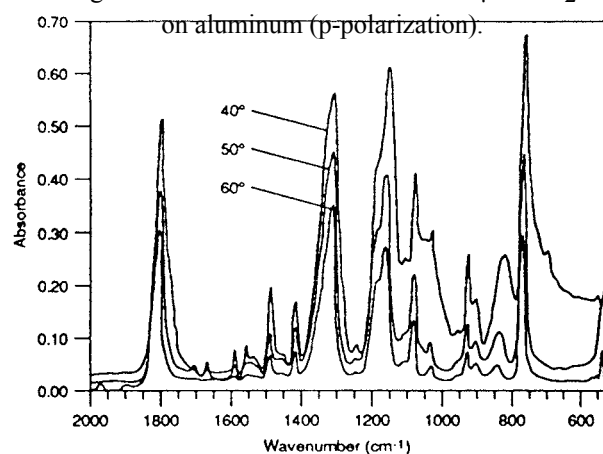


Figure 3. Internal reflectance of a 2.5 μm mylar film on a silicon substrate.

In addition, a model of the Seagull™ with independently variable angles of incidence and collection is available on special order.

The versatility of the Seagull™ makes it a powerful tool for the analysis of a number of different sample types using a variety of reflection techniques. Representative spectra are shown in Figures 2 through 5.

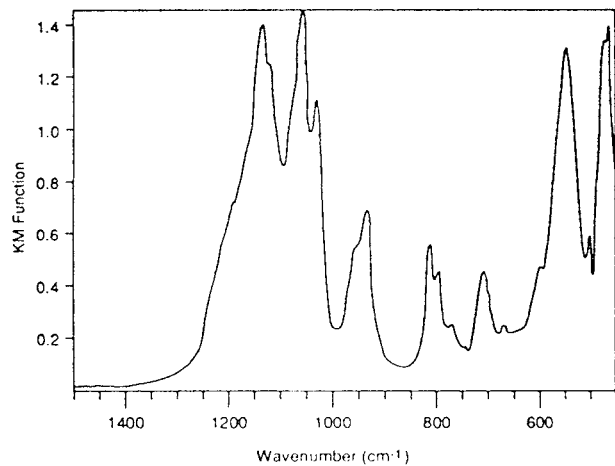


Figure 4. Diffuse reflectance of kaolinite diluted in KBr at a 15° angle of incidence.

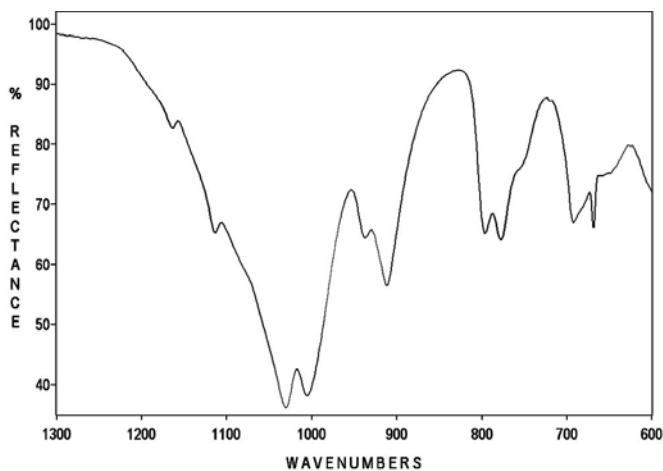


Figure 5. ATR spectrum of 10 μm silica powder, recorded at a 45° angle of incidence using the powder sample holder.