



THE SEAGULL™

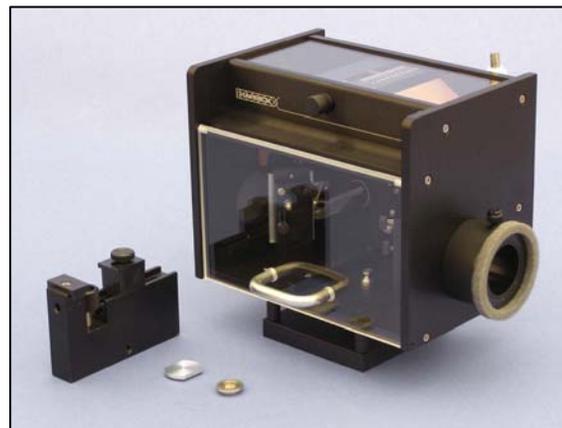
The Seagull™ is a powerful attachment for examining numerous types of samples using a variety of reflection techniques. This unique accessory can be easily adapted for external, internal or diffuse reflection spectroscopy. In addition, it can be operated over a broad range of incident angles without 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.
- ▶ Direct angular read-out for all measurements; no ATR angle correction needed.
- ▶ No realignment of the accessory or repositioning of the sample required when varying the incident angle.
- ▶ Maintains polarization for angles.
- ▶ High optical throughput.
- ▶ PermaPurge™ permits changes in angle without interrupting the purge of the system.
- ▶ Options available:
 - ▶ Ming-Sung™ ATR Rotator for studying oriented polymers available separately.
 - ▶ Liquid, powder and heated sampling accessories available.
 - ▶ Two-position wire grid polarizer.
 - ▶ ATR Kits with a ZnSe or Ge hemisphere, holder, pressure plate and clamp. High Force Ge ATR Kit also includes a torque screwdriver.



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.

ORDERING INFORMATION

Seagull™	CATALOG NO.	SEA-XXX
Seagull™ Research Package (includes Seagull™, ATR Kit with ZnSe crystal and wire grid polarizer)		SRP-XXX
Seagull™ Research Package (includes Seagull™, ATR Kit with Ge crystal and wire grid polarizer)		SRP-J-XXX

OPTIONS

	CATALOG NO.		CATALOG NO.
Wire Grid Polarizer, KRS-5 Substrate	PWG-SEA	Trough Liquid Cell	SEA-TLC
ATR Kit, ZnSe	SEA-IRK-M	Heatable Flow-Through Liquid ATR Cell, 24V	SEA-HLC-3
ATR Kit, Ge	SEA-IRK-J	Heated Sample Stage, 24V	SEA-HOT-3
High Force Ge ATR Kit	SEA-IRK-JH	Temperature Controller, 110V, with USB adapter.	ATK-024-1
Ming-Sung™ ATR Rotator	SEA-MNP	Temperature Controller, 220/240V (CE marked), with USB adapter.	ATK-024-2
Flow-Through Liquid Cell	SEA-FLC		

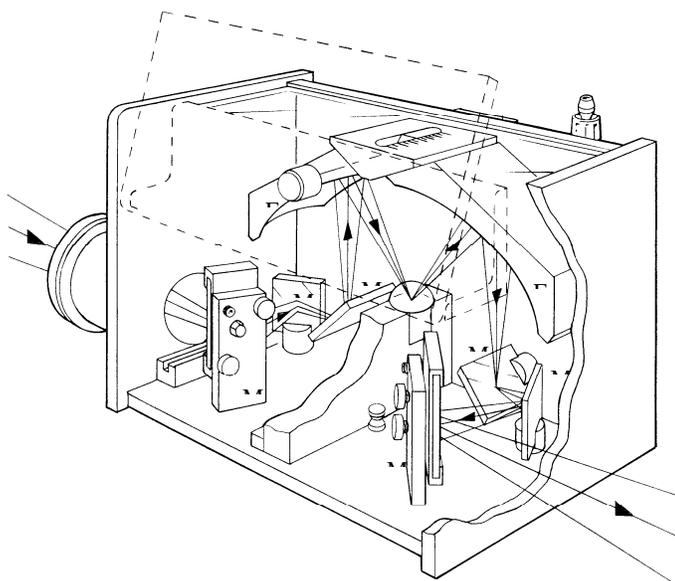


Figure 1. The Seagull™ variable angle reflection accessory.

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 an ATR Kit that includes a ZnSe or Ge ATR hemisphere mounted in a holder. The holder simply slides into the Seagull in place of the standard one. The holder has a built-in pressure applicator. The kit also includes a compatible pressure plate and is compatible with our standard torque screwdriver. The High Force Ge ATR Kit includes a torque screwdriver and is specially designed for examining thin films on silicon and reflective substrates.

A flow-through liquid cell is offered for ATR studies of liquids. 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 is also available for examining liquids from room temperature to 150°C.

For ATR measurements of powders, a convenient powder holder 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 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 ATR Kit.

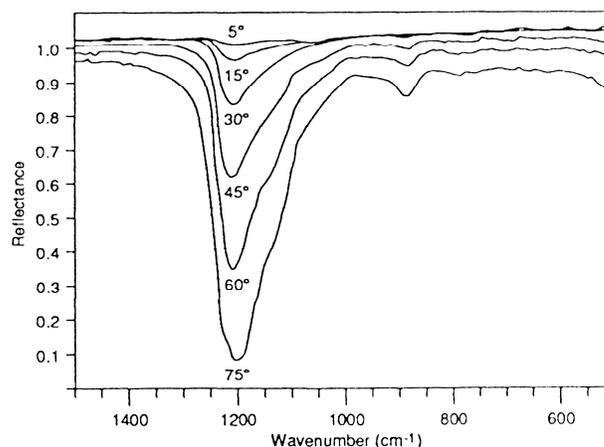


Figure 2. External reflectance of 0.05 μm SiO_2 on aluminum (p-polarization).

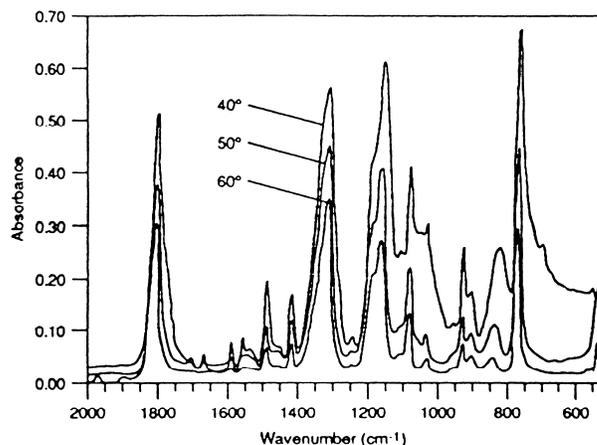


Figure 3. Internal reflectance of a 2.5 μm mylar film on a silicon substrate.

A heated sample stage is available for operation up to 150°C. This stage can be used to support samples for either ATR or specular reflectance measurements.

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

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.

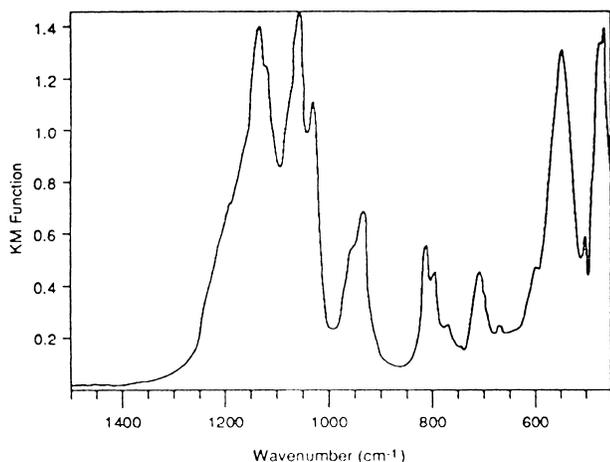


Figure 4. Diffuse reflectance of kaolinite diluted in KBr at a 15° angle of incidence.

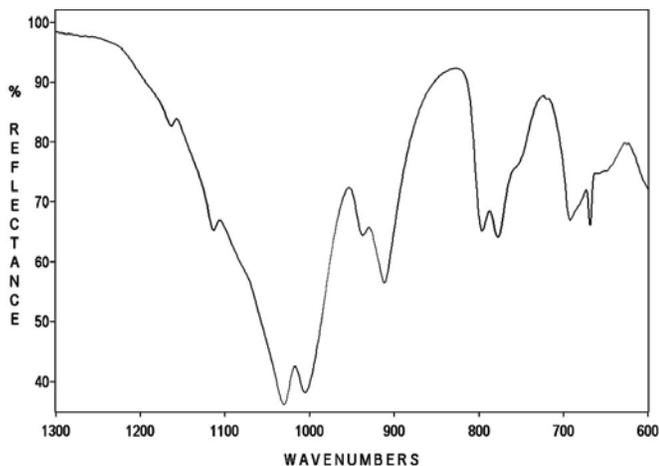


Figure 5. ATR spectrum of 10 μm silica powder, recorded at a 45° angle of incidence using the powder sample holder.