Product Overview

Specac
brilliant spectroscopy

HARRICK
a Specac company

www.specac.com

Welcome to Specac's product overview brochure

This brochure is intended to give a high-level overview of Specac's product range, covering accessories for **FTIR spectroscopy**, hydraulic presses, pellet dies, polymer film making, and other spectroscopy **sample preparation** tools, and process flow cells for industrial chemical **process spectroscopy**.

Resources Online

To learn more about the techniques offered and the applications of the products, visit our website **specac.com.**

Application Notes

eBook guides

FTIR sampling packs & kits

Basic solid sampling pack

A 2-ton Mini-Pellet press for making KBr sample pellets of 7 mm diameter. Includes a pestle and mortar for grinding the powders, and a disc holder for mounting in the spectrometer.

What are these packs for?

These packs contain a selection of items from Specac's portfolio which enable analysis of either solids, liquids, or gases by the transmission method.

- **Solid** materials may be ground to a powder and then diluted in potassium bromide (KBr) powder, before being pressed into a solid pellet. You may use the **basic** or **advanced solid sampling pack** for this.
- **Liquids** can be injected into a transmission cell. The **liquid sampling pack** contains everything you need for this.
- **Gases** can be introduced to a gas cell with windows at either end for measurement in the IR beam. For this we recommend the **gas sampling pack**, although for many gases larger multi-pass cells are required.

Advanced solid sampling pack

Upgrade to a full size 15-ton press and a 13 mm pellet die for making KBr sample pellets. Includes a pestle and mortar for grinding the powders, and a disc holder for mounting in the spectrometer.

Liquid sampling pack

Contains an Omni-Cell and a selection of windows and spacers, along with a bottle of Nujol® for preparing a mull sample.

Gas sampling pack

Contains a Pyrex® Storm 10 cm gas cell with KBr windows and a 3" x 2" slide mount holder.

Attenuated total reflectance (ATR) accessories

WATCH: How Quest ATR Handles Different Sample Types

Quest™ ATR

Single reflection ATR accessory. Innovative optical design with all-reflective optics and durable monolithic ATR crystals.

ATR crystal materials:

Diamond | Diamond (AR coated) | ZnSe | Ge | Si

Available sample conditioning options:

- Sample heating (up to 110 °C)
- Liquid microsample attachment
- Arrow™ Silicon consumable ATR slides

Golden Gate® ATR

Single reflection diamond ATR accessory. Robust build with large suite of available top-plates for advanced ATR sampling.

ATR crystal materials:

Diamond

Available sample conditioning options:

- Sample heating (up to 300 °C)
- Sample cooling (up to -190 °C)
- Microsample liquid flow attachment

HARRICK Solutions in Optical Spectroscopy

VariGATR™ Grazing Angle Accessory

A variable incidence grazing angle (60 - 65°) ATR accessory, excelling in the analysis of monolayers and adsorbed species on semiconductors and metal surfaces.

ATR crystal materials:

Ge

Optional Add-on

- Digital Force Gauge

HARRICK Solutions in Optical Spectroscopy

ConcentratIR2™ Multiple Reflection ATR

Multiple-reflection ATR accessory for highly sensitive analysis of small quantities. Only 10 µl of sample is required. 10 reflections are obtained with the diamond ATR element, 11 with silicon. Heated flow cells available.

ATR crystal materials:

Diamond | Silicon

Available sample conditioning options:

- Sample heating (200 °C)
- Flowing sample

Gateway™ 6-reflection HATR

Six reflection ATR accessory with large area crystal. Attachments for flowing and heating of liquid samples are available.

ATR crystal materials:

ZnSe | Ge | Si

Available sample conditioning options:

- Sample heating (200 °C)
- Flowing sample

Liquid transmission accessories

Omni Cell™

Uses either demountable windows and spacers or pre-set "sealed" window units, sandwiched between 3" x 2" backing plates.

Pathlengths:

0.006 mm — 1.00 mm

Window materials:

NaCl, KBr, ZnSe, CaF_2, BaF_2, KRS-5, AgBr, Silica, Polyethylene

Pearl™ liquid transmission

The Pearl uses Specac's innovative Oyster cell assembly, which holds the sample in a horizontal plane. The top window lifts off to allow for fast and easy application and cleaning of samples.

Pathlengths:

0.025 mm — 1.00 mm

Window materials: ZnSe, CaF_2

Window options:

- Wedged to remove interference fringing
- Parallel

Oil flow cells

These flow cells have a fixed 100 µm pathlength and ZnSe windows, ideally suited to analysis of insulating and lubricating oils by standard norms of measurement.

Window materials:

ZnSe

Available sample conditioning options:

- Flowing sample
- Inline cleaning port

Gas cells

Atmos™ long pathlength cells

Metal bodied, heatable multipass infrared gas cells with fixed pathlengths of 2.5, 5.0, or 10.0 m. Suitable for trace analysis of gases at low concentrations or low absorbance.

Pathlengths:

2.5 m — 10 m

Window materials: KBr, ZnSe, CaF_2

Additional options:

- Internal thermocouple
- Heating Jacket (Up to 200°C)

Body materials:

Ni-coated aluminium

Cyclone™ long pathlength cells

Glass bodied multipass infrared gas cells with either fixed or adjustable pathlengths of nominal 2.5, 5.0, or 10.0 m sizes.

Pathlengths:

0.5 m — 10 m

Window materials: KBr, ZnSe, CaF_2

Addtional options:

- User adjustable pathlengths

Body materials:

Borosilicate glass, Ni-coated aluminium

Storm™ short path gas cells

Fixed 10 cm pathlength cell for analysis of high concentration or highly absorbing gas species. A dedicated high temperature version is available also.

Window materials: NaCl, KBr, ZnSe, CaF_2, BaF_2

Body materials:

Pyrex®, Stainless steel

Addtional options:

- High temperature version (up to 250 °C)

Heated transmission cells & holders

Heatable demountable liquid cells

Demountable liquid cells with optional flow ports and tubing designed for use with our range of heating/cooling accessories.

Window materials:

NaCl | KBr | ZnSe | CaF_2 | BaF_2

Available sample conditioning options:

- Sample heating (up to 250 °C with EHJ or VT cell)
- Sample cooling (up to -70 °C with VT cell)
- Flowing sample

Pathlengths:

0.006 mm — 1.00 mm

Variable Temperature (VT) cell holder

A combination of electric heaters and a vacuum-insulated liquid nitrogen Dewar allows the temperature to be set from +250 to -190 °C.

Ambient cell holder (non-heated)

A simple 3" x 2" slide mountable holder for using heatable sample cells at room temperature conditions.

Water heating jacket (WHJ)

Heats the sample cell up to 90 °C using hot water circulated by an attached water bath accessory.

Electric heating jacket (EHJ)

Heats the sample cell up to 250 °C using an electric heater cartridge.

Need consultation for your research?

Why not contact us using the QR code below

https://specac.com/contact-us/

HARRICK SCIENTIFIC
Solutions in Optical Spectroscopy

High Temperature Cell

Permits transmission measurements studies of solid samples at temperatures ranging from ambient to in excess of 500°C in a controlled environment. The High Temperature Cell is ideal for examining catalytic and other gas-solid chemical interactions.

High Temperature / High Pressure (HTHP) transmission & reflectance cell

The HTHP cell can be set up for transmission or near-normal reflectance measurement. Its sample chamber can be heated up to 800 °C under vacuum (up to 4.0 x 10-3 mbar a) and pressurised up to 68 bar g.

Please note: it is also possible to analyse solid samples with these heating jackets. Ask your Specac representative for more information.

Praying Mantis - Reaction chambers

Specac Ltd has acquired Harrick Scientific, a renowned manufacturer of infrared spectroscopy products that perfectly complement Specac's high-performance spectroscopy accessories.

Since 1969, Harrick Scientific has been a pioneer in optical spectroscopy, thanks to its founder Dr. N. J. Harrick, who developed internal reflection spectroscopy. Harrick offers a wide range of standard and custom-built accessories for IR and UV-VIS spectrometers, many of which are industry standards. They also provide optical elements such as windows, ATR plates, prisms, and hemispheres.

Notably, Harrick's Praying Mantis™ diffuse reflectance kit is the industry standard for heterogeneous catalyst experiments. Its "off-axis" design minimizes specular reflections, and it can be equipped with high (up to 910 °C) and low (-150 °C to +600 °C) temperature reaction cells.

Praying Mantis™ Diffuse Reflection Accessory

The Praying Mantis was the first generally available diffuse reflection attachment and remains the forerunner in the field. It incorporates two 6:1, 90° off-axis ellipsoids that form a highly efficient diffuse reflection illumination and collection system.

Praying Mantis™ Low Temp. Reaction Chamber

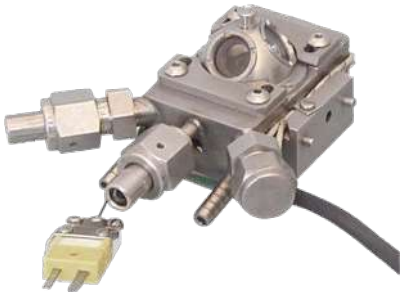
Allows diffuse reflection measurements under a wide range of controlled temperatures and pressures and is used in conjunction with the Praying Mantis Accessory for FT-IR and UV-Vis diffuse reflectance spectroscopy. Designed for studies from high vacuum (133 µPa or 10^{-6} torr) to 133 kPa (1 ktorr) and at temperatures from -150°C to 600°C (under vacuum).

Window materials:

SiO_2 Si CaF_2 ZnS ZnSe KBr

Spectral ranges covered

- UV/VIS NIR
- FT-IR



Praying Mantis™ High Temp. Reaction Chamber

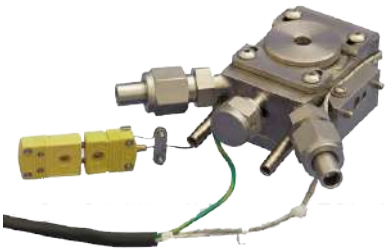
Particularly effective for powders that have high surface areas. This makes diffuse reflectance a valuable tool for studying heterogeneous catalysis, gas-solid interactions, photochemical reactions, and oxidation mechanisms. Designed for operation from high vacuum (133 µPa or 10^{-6} torr) to 133 kPa (1 ktorr) with KBr windows or 1.5 MPa (11.2 ktorr) with ZnSe or SiO_2 windows. Readily adapted for operation up to 3.44MPa (25.8 ktorr) with an optional high-pressure dome.

Window materials:

SiO_2 Si CaF_2 ZnS ZnSe KBr

Spectral ranges covered

- UV/VIS NIR
- FT-IR



Raman High Temperature Reaction Chamber

Effective tool for Raman measurements of powders under controlled environmental conditions.

Designed for operation from high vacuum to 25.8 ktorr and for temperatures up to 910°C (under vacuum).

Window materials:

SiO_2 Al_2O_3

Why not visit our Applications Page?

https://specac.com/application-notes/

Specac's products offer robust and versatile solutions for industries including Chemicals & Materials, Pharma, Biotechnology & Life Sciences, Food & Beverage, Mining & Refining, Process Analytical Technologies, and Public Health. Built to withstand rigorous laboratory use, our products provide reliable and repeatable results while also being versatile enough to meet the unique needs of each industry. Our commitment to robustness and versatility makes our spectroscopy products the ideal choice for any laboratory in need of reliable and accurate solutions. You can browse the application notes according to **industry below** or **view all in this link**

Chemicals & Materials

The chemical industry is responsible for producing everything from bulk commodity chemicals to engineered materials used in the home and office; infrared spectroscopy is used throughout the industry for quality control, research & development, and fault analysis.

Food & Beverage

The food and beverage industry is increasingly concerned with the origin and labelling of food stuffs due to widespread appearance of common substitutes and adulterants. FTIR, combined with chemometrics, provides a powerful tool for identifying and discriminating between different foodstuffs.

Mining & Refining

Heavy industries such as mining and refineries are major users of elemental analysis techniques such as XRF, XRF, and LIBs; sample preparation for this techniques is key to accurate and rapid reporting of results.

Pharma, Biotechnology & Life Sciences

Infrared spectroscopy is used throughout the pharmaceutical industry, but sees particular use in the final stages of formulation, manufacturing, and certification; applications for FTIR in the earlier stages of drug discovery are growing.

Process Analytical Technologies

Specac's process analysis cells are used in several industries for reaching chemical process lines with NIR spectroscopy.

Public Health & Environment

Meeting public health needs is a major challenge. Work to identify environmental contaminants, reduce pollution, and keep the public out of harm's way from illicit and illegal substances can often involve infrared spectroscopy.

Microsampling accessories

DC-3™ Diamond Compression Cell

Two stainless-steel plates with 1.8 mm diamond window apertures for compressing samples for transmission micro-spectroscopy. Easily fits all commercially available IR microscopes.

Window materials:

Diamond

Microfocus Beam Condenser

A 4x beam condenser for analysing small samples in transmission without a microscope. Can also mount the DC-3 diamond compression cell.

Focusing lens materials:

ZnSe KRS-5

Micro Compression Cell

Compresses soft materials to a thickness suitable for micro-transmission analysis using either an IR microscope or a benchtop FT-IR spectrometer. Windows have an aperture of 7 mm.

Window materials:

NaCl KBr ZnSe CaF_2 BaF_2

Specular reflection accessory

Seagull™ Variable Angle Reflection Accessory

A powerful variable-angle (5-85°) reflectance accessory for examining powders, optical coatings, opaque substrates, films on opaque substrates, and slightly curved solids. Can also perform ATR measurements with optional ATR hemispheres.

OPTIONAL ATR HEMISPHERES:

ZnSe Ge Si

Refractor2™ Grazing Angle Accessory

Compact grazing angle (75°) reflection accessory featuring SuperCharged(tm) wedged windows and an internal Si polarizer to enhance spectral contrast. Ideal for thin films on metal substrates and semiconductor coatings.

RefractorReactor™ Grazing Angle Accessory

Study reactions and thin films on metal substrates with control of temperature and pressure in the reaction chamber. Can be heated up to 500°C and pressurized up to 203 kPa (2 atm).

Variable Angle Reflection Accessory

Ideal for specular reflection studies of films on metallic substrates, coatings, contaminants on reflective surfaces, and measurements of film thickness.

Spectral ranges covered

- UV/VIS
- FT-IR

Variable Angle Transmission Accessory

Excellent for examining thick samples and optical coatings thereon at any angle using transmission spectroscopy.

Spectral ranges covered

- UV/VIS
- FT-IR

Process spectroscopy flow cells

An eye into your process – Specac process flow cells inspire confidence on the frontline of your PAT solution.

Specac aims to provide robust solutions for reliable Process control. We are constantly innovating to provide sample interfaces that meet the harshest of environments for the safety of our customers and those around them.

We aim to give customers peace of mind when monitoring their processes so that their operators and employees feel safe and in control.

Utilising advanced process control reduces carbon footprints and waste. Specac is proud to play its part in the Green transition of industrial chemistry.

Why choose Specac

We consult with your engineers to understand your process requirements.

Cell solutions at all stages, from feasibility to full scale production.

Proven track record in the most demanding industrial environments.

Continued support for servicing and repairs for years to come.

Vortex™ Liquid Flow Cell

A flange-mounted in-line flow cell for NIR spectroscopy. The cell is connected via fiber optics to a remote process spectrometer. It has a preset pathlength of 2-10 mm as standard. Can be made in custom sizes and material configuration to suit the application.

Typhoon™ Gas/ Vapour Flow Cell

A single-pass gas/vapour cell for NIR process spectroscopy. Fiber optic connections transfer light between the cell and the spectrometer. Manufactured in pathlengths of 20, 30, or 50 cm (or custom size.)

Spyder™ Liquid Flow Cell

The Spyder™ is a spectroscopic flow cell intended for use in laboratories and small-scale pilot plants. When connected to a suitable nearinfrared process analyzer using fiber optic cables it enables the analysis of liquid products flowing within a continuous chemical process.

Hydraulic presses

Manual hydraulic press

The 15-ton and 25-ton Manual Hydraulic Presses have been designed to handle a wide variety of pressing applications. They are specifically suited to the preparation of XRF sample pellets using Specac pellet dies.

Tonnage ranges:

- 0.0 T – 25 T
- 0.0 T – 15 T

Pelletising and film making accessories:

- Pellet dies
- Heated platens (300 °C)
- Constant thickness film makers

Atlas™ Autotouch & Atlas™ Power press

These powered hydraulic presses are verstatile laboratory presses used for precision pressing applications or semi-automated XRF sample prep.

The Autotouch version adds a touchscreen and programming capability to the Power press frame.

Tonnage ranges:

- 4.0 T – Autotouch model only – 40 T
- 3.0 T – 25 T
- 2.0 T – 15 T
- 1.0 T – 8 T

Pelletising and film making accessories:

- Pellet dies
- Heated platens (300 °C)
- Constant thickness film makers

Apex™ 400 press

The Apex 400 hydraulic press is a benchtop press designed for intensive use in industrial XRF analysis settings. It can produce sample pellets in steel rings, aluminium cups, or as unsupported pellets. QuickShift™ technology enables rapid extraction of the pellet when using standard dies.

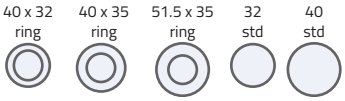
Tonnage ranges:

- 1.0 T – 40 T

Pelletising and film making accessories:

- Dedicated pellet dies
- Ring dies for high-throughput preparation

Diameter sizes (mm):



Heated Platens & Film Makers

Atlas™ Heated Platens

Electrically heated platens capable of reaching 300 °C. They have a diameter of 100 mm and feature a coolant circuit to prevent overheating.

Atlas™ Constant Thickness Film Maker Kit (CTFM)

For use with the Heated Platens, this kit makes thin polymer films of 29 mm diameter and nominal thicknesses of 15, 25, 50, 100, 250, or 500 µm.

Atlas™ High Temperature Film Maker Kit

This kit has built-in heated platens that can reach 400 °C. Like the CTFM it makes thin polymer films of 29 mm diameter and nominal thicknesses of 15, 25, 50, 100, 250, or 500 µm.

Pellet dies

Evacuable Pellet Dies

Used to compress powders into solid cylindrical pellets. Made from 440C stainless steel, featuring five main parts: body, base, plunger, and 2x internal pressing pellets. A vacuum port enables removal of excess air.

Diameter sizes:

5 10 13 20 32 40

Alternative options (32 and 40 mm only):

- "Lightweight" 3-piece configurations
- Tungsten carbide internal pressing pellets
- Die without vacuum port

Mini-Pellet Press & Mini-Film Maker

Mini-Pellet™ Press

A 2-ton Mini-Pellet press for making KBr sample pellets of 7 mm diameter. It weighs under 5 kg and is therefore portable. The handscrew requires minimal physical effort to apply full load.

Mini-Film™ Maker Kit

Heated platens integrated within a Mini-Pellet Press that can make 15 mm diameter films in minutes. Nominal thicknesses of 15, 25, 50, 100, 250, or 500 µm are achievable.

Consider your consumables

- **Pelletising aids** help to keep pellets free of defects and aid their removal from the dies. They include various **binders**, crushable **aluminium support cups**, and non-stick **protective films**.
- **XRF consumables** including **sample cups and thin-film windows** for preparing liquid and powder samples, and **lithium borate fluxes** for making fused beads.
- **Aluminium foils** and paper **sample holders** for **thin polymer film making**.

Other Products Offered By Specac

Infrared polarizers

Wire Grid Polarizers

Linear polarizing filters for both mid-IR and far-IR/THz spectral regions. Manufactured in two types: holographic wire grids and free-standing wire grids.

Free-Standing IR/THz Wire Grid Polarizers

These polarizers consist of an array of parallel 5 µm or 10 µm tungsten wires secured to a mounting frame with a wire spacing of 12.5 µm or 25 µm.

Holographic Polarizer Rotation Mounts

A slide-mounted (3" x 2") manual polarizer rotator mount with 1 degree angle gradations.

KEY

✓= Standard functionality

☑ = Requires additional accessories

O = May be suitable (contact Specac)

		Reflectance								Transmission											
		ATR					Diffuse	Specular	Specular/ATR	Liquid cells					Solids holders				Gas cells	
		Quest™	Golden Gate®	VariGATR™	Gateway™	ConcentratIR2™	Praying Mantis™	Refractor2™	Seagull™	Omni Cell™	Harrick DLC	Pearl™	3-Port Oil Flow Cell	Heatable Liquid Cells	Heatable Solids Holders	HTC	HTHP Cell	DC-3™	Atmos™	Storm™
Solids	Thick Flat Samples	✓	✓															✓		
	Flat/smooth (including pellets)	✓	✓		✓										✓	✓	✓	✓		
	Rough/abrasive	O	✓		O		✓		✓						O		✓	✓		
	Fibres/wires	O	☑				✓											✓		
Powders	Finely ground	✓	✓		✓		✓		✓									✓		
	Coarse/crystalline	O	✓		O		✓		✓									✓		
Thin Films	Thin films on metals			✓				✓	✓											
	Monolayers on metals			✓					☑											
Liquids	Common liquids/ mixtures/suspensions	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓						
	Gels/greases	✓	✓		✓	✓			✓			✓								
	Low concentration components					✓														
Gases	Major/strongly absorbing components																		✓	✓
	Minor/weakly absorbing components																		✓	
	Evolved gas/ decomposition																			☑
Experimental control features	High Pressure		☑				☑										✓		✓	✓
	Low Pressure						☑									✓			✓	✓
	High Temperature	☑	☑		☑	☑	☑		☑					✓	☑		✓		☑	☑
	Low Temperature		☑				☑							☑	☑					
	Gas Flow						✓									✓				
	Non-contact Sampling Surface						✓	✓	✓							✓				
	Variable Incident Angle			✓					✓											
	Flowing sample	☑	☑		☑	☑	☑		☑		✓		✓	✓			✓		✓	✓

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Which spectrometers are Specac's accessories compatible with?

Our products are compatible with most models sold by the major manufacturers, including Thermo Fisher, PerkinElmer, Bruker, Shimadzu, Jasco, and Agilent (formerly Varian & BioRad).

A non-exhaustive list of spectrometer models is as follows:

Thermo Fisher (Nicolet): Summit, iS5, iS10, iS20, iS50, Nexus 6700/8700, Avatar, Magna; **Perkin Elmer**: Spectrum 2, Spectrum 3, Frontier, Spectrum One, Spectrum 100/400, Spectrum 2000, Spectrum BX, Spectrum GX; **Bruker**: Invenio, Vertex, Tensor, Equinox, IFS-series; **Shimadzu:** IRSpirit, IRXross, IRTracer, IRAffinity; **Jasco** FT-IR 4000/6000; **Agilent/Varian:** Cary 600, Cary 660/670/680; **PG Instruments** FTIR 7800