GladiATR Illuminate –
Diamond ATR For Photocuring

FEATURES

- Illuminate UV/Vis Light through the diamond ATR element
- Diamond crystal design – cannot scratch or fracture
- All reflective optics – full spectral range for the analysis in the mid-IR and far-IR regions
- Temperature-controlled options available
- Compatible with most FTIR spectrometers

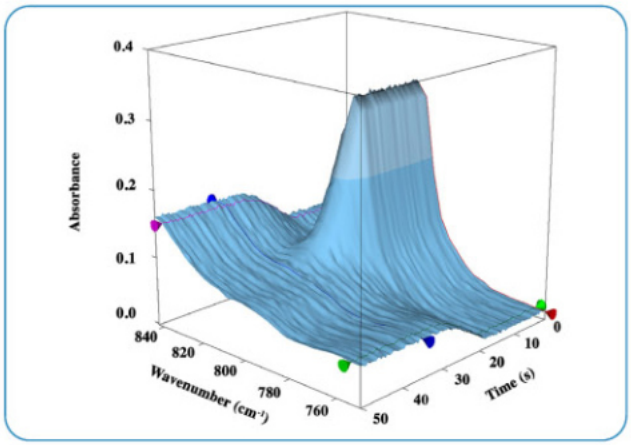
The GladiATR Illuminate is an ATR accessory designed for the analysis of photocuring or the solidification of liquid resins upon exposure to light. The ability to track this process in real-time enables resin optimization, tailored for a particular application, by monitoring the solidification process through changes in chemical functionality and determine reaction kinetics. Application examples include evaluating dental coatings and sealants, medical adhesives, photoresists, and 3D printing.

Conventional photochemical setups irradiate samples from top-down, while IR measurements presented are being taken from the bottom-up. This disparity results in a difference in light intensity throughout the depth of the sample due to absorption and sample thickness nonuniformity, and limits the accuracy of analysis and mitigates characterization of opaque resins. The GladiATR Illuminate overcomes these challenges by illumination from beneath the sample through a diamond ATR prism by integrating a liquid light guide through the GladiATR base optics. This design feature aligns the absorption cross section of the sample with the evanescent wave of the IR beam for characterization. To maximize the light introduced to the ATR crystal and sample. An optical lens is incorporate at the light guide tip.

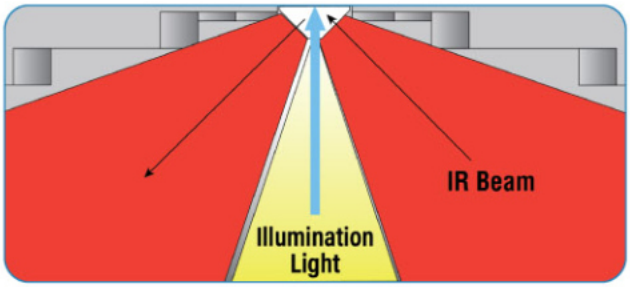
The GladiATR Illuminate optical design is all reflective, preserving the full spectral range inherent to diamond. For standard mid-IR FTIR spectrometers, the spectral range available with the GladiATR Illuminate will be 4000–400 cm^{-1}. For FTIR spectrometers equipped with far-IR optics, the spectral range is extended to less than 50 cm^{-1}.

Temperature controlled crystal plates are available for thermal study of materials. The resistively heated diamond plate has a temperature range from ambient to 210 °C. PIKE Technologies offers temperature controllers with digital and PC programmable set points with TempPRO software (sold separately). This allows for easily programmed temperature profiles and unattended data collection with most FTIR software platforms. For applications requiring temperatures from sub-ambient to 210 °C, liquid jacketed plates are available.

The GladiATR Illuminate diamond ATR is available in configurations to fit most FTIR spectrometers.



Acrylate photopolymerization using 405 nm light. Waterfall plot showing the band change over time. Irradiation began at 19 seconds.



Diamond crystal plate of the GladiATR Illuminate accessory. IR beam and illumination meet at the sample position.

Specifications

ATR Crystal Choices	Diamond
Crystal Plate Mounting	User changeable plates
Crystal Type	Monolithic
Diamond Mounting	Brazed
Crystal Plate Mounts	Stainless steel
Angle of Incidence	45 degrees, nominal
Crystal Dimensions (surface)	3.0 mm diameter
Optics	All reflective
Pressure Device	Rotating, continuously variable pressure; click stop at maximum
Digital Force Adapter (option)	Load cell sensor for precise and reproducible pressure control. Attaches directly to GladiATR clamp. Digital readout. For ambient temperature measurements only.
Maximum Pressure	30,000 psi
Sample Access	80 mm, ATR crystal to pressure mount
Spectral Range, Diamond	4000 to 30 cm^{-1} (IR optics dependent)
Liquid Light Guides	
Core	3 mm
Length	1.2 m
Minimum bend radius	40 mm
Heating Options	Diamond, 210 °C maximum
Accuracy	+/- 0.5% of set point
Sensor Type	3 wire Pt RTD (low drift, high stability)
Temperature Control	Touch-panel display with USB interface. PIKE TempPRO software (sold separately) for PC control with unlimited ramps and automated data collection.
Input	100–240 VAC, auto setting, external power supply
Output	4A/24 VDC 100 W maximum
Purge Sealing	Purge tubes and purge line connector included
Accessory Dimensions (W x D x H)	140 x 225 x 340 mm (excludes FTIR baseplate and mount)
FTIR Compatibility	Most, specify model and type

Ordering Information

GladiATR Illuminate Base Optics

(must select one)

Part Number	Description
026-16XX	GladiATR Illuminate Base Optics

Notes: Replace XX with your spectrometer's Instrument Code listed on page 164. GladiATR Illuminate Base Optics include purge tubes, purge kit and spectrometer base mount. Liquid light guide sold separately.

GladiATR Stainless Top

(must select one or more)

Part Number	Description
026-2001	GladiATR Stainless Top
026-2002	GladiATR Heated Stainless Top
026-2003	GladiATR Liquid Jacketed Stainless Top

Crystal Plates for GladiATR and Temperature Controller

(must select one or more)

Part Number	Description
026-2103	Illuminate Diamond Crystal Plate
026-4103	Illuminated Heated Diamond Crystal Plate, 210 °C
026-4113	Illuminate Liquid Jacketed Diamond Crystal Plate, 210 °C
076-1610	Digital Temperature Control Module
007-0207	PIKE TempPRO Software

Notes: GladiATR Crystal Plates are pinned-in-place. Changing crystal plates is easy and fast to optimize sampling results. For heated diamond crystal plates, maximum crystal temperature is 210 °C. Temperature controller is required for heated crystal plates. If PC control is desired, TempPRO software must be purchased (sold separately from Temperature Control Module). Liquid jacketed crystal plates require customer-provided circulator.

High-Pressure Clamp for GladiATR Illuminate

(must select for solid or powdered samples)

Part Number	Description
026-3020	High-Pressure Clamp
076-6026	Digital Force Adapter for High-Pressure Clamp

Notes: The High-Pressure Clamp is required for analysis of solids, powders and for use of liquids retainer and/or Digital Force Adapter (Digital Force Adapter may be used with samples at ambient temperature only). Pressure clamp includes a flat tip, a swivel tip and a concave tip.

GladiATR Illuminate Liquid Light Guides

Part Number	Description
162-4920	Liquid Light Guide 340-800 nm
162-4922	Liquid Light Guide 420-2000 nm

Notes: Liquid light guides are 1.2 m long, and have a 3 mm core. Contact us for alternative lengths or light guides themselves.

GladiATR Sampling Options

Part Number	Description
026-5014	Flow-Through Attachment, 100 µL
026-5013	Liquids Retainer and Volatiles Cover Set
026-3051	Volatiles Cover
026-5010	Liquids Retainer

Note: Flow-Through Attachment and Liquids Retainer are compatible with all crystal offerings (High-Pressure Clamp required).