Luzchem

Shedding light on new ideas

Version 07A

May 2007

www.luzchem.com

NEW!!!!
MSL
Modular Spectroscopy Laboratory

Fluorescence
Absorbance
Thin Film Analysis
Spectroradiometry
Diffused Reflectance
Stopped Flow
and more

See Page 14

Product lines

- Laser flash photolysis
- Photoreactors, exposure tools,
- UV curing equipment
- Thin film metrology
- Xenon illumination products
- Spectroscopy supplies
- Spectroradiometers
- Stopped flow

Ordering information

1-613-749-2442

Payment

The normal form of payment is by cheque or wire transfer once the products ordered are ready for shipment. Luzchem will provide the buyer with copies of the final invoice and shipping documents, and wait for confirmation of payment from our bank before releasing the shipment. Any other arrangements must be pre-approved by Luzchem.
Minimum order: US $100.00 (shipping charges additional).

Letters of Credit (LOC)

LOC are subject to an administration fee of 1,000 Euros. Luzchem will not accept LOC that do not comply with Luzchem's guidelines for LOC.

Restocking policy

Luzchem charges a 25% restocking fee on all returns. Software and lamps and other consumables are not returnable.

Shipping costs

Luzchem normally ships using FedEx or UPS. Shipping charges will be based on the rate provided by the courier company. Clients wishing to use other means of shipment may be subject to an administration charge.

Insurance costs

Luzchem insures all shipments at customer expense.

Currency

Prices are listed in US dollars, EUROS and Canadian dollars. Luzchem can provide quotations and accept payment in US dollars, Canadian dollars and Euros. Payment in Euros must be made by wire transfer (cheques can not be accepted).

Taxes

Sales tax and GST are added to Canadian orders. Customers outside Canada should be aware that local taxes and import duties are not included in Luzchem prices. End users should inquire locally about taxes applicable upon receipt, such as IVA in Europe. Some countries may waive or reduce charges for educational organizations; please consult local authorities to obtain this information.

All prices subject to change without notice

TAXES NOT INCLUDED

Table of contents

Special needs?

If you have any features that you would like added to our products, we want to hear from you. Luzchem is always looking for ways to improve our products. Please contact us at *sales@luzchem.com.*

Our Cover: *Auroras Boreal* by Elda Scaiano, 2005.

Exposure Tools, Accessories & Options

Photoreactor

Luzchem offers a range of UV-Visible exposure tools for controlled irradiation. Different wavelength ranges in the UV and visible regions are available from both broadband fluorescent and xenon lamps.

Basic irradiation chambers have internal dimensions of approximately 12 inches wide, 12 inches deep, and 8.5 inches high (30 x 30 x 22 cm). Fan and exhaust lines are included with most chambers. One set of safety goggles (cut-off approximately 420 nm) is included. All photoreactors are air-cooled . The excellent air flow design stabilizes the temperature about 3-4ºC above room temperature.

Note: Most photoreactors are manufactured for 110 V, 50/60 Hz unless otherwise indicated. A transformer (see p.8) is needed for clients in countries where 220 V is the standard.

Basic photoreactors

Note: For Xenon Illumination products, see page 13.

Luzchem offers three basic photoreactor systems. Choose a basic photoreactor and add the accessories best suited for your needs. Customized packages take approximately 4-6 weeks for delivery.

Luzchem's range of pre-configured package are suited to a variety of needs and applications and offer cost savings to the customer. These items are regular stock items and usually ship out within one week.

Model	Lamp #	Arrangement	Notes
LZC-1	8	Top irradiation	Best for solids, films and Petri dishes
LZC-5	8	4 lamps on each side	Best for liquids
LZC-4	14	6 lamps on top, 4 on each side	Dual irradiation model

Lamps sold separately

Photoreactor packages

LZC-4V: Versatile Top and Side Irradiation model V

- 6 top lamps and 8 side lamps
- 14 UVA lamps and 14 UVC lamps included
- Safety Features include: Safe Exhaust and Safety Goggles
- Installed options include: Installed Motor Drive and Recessed Magnetic Stirrer
- Carousel and Turntable for use with Installed Motor
- Power Meter for use with Luzchem LZC-VIS and LZC-UVA lamps
- Installed Digital Countdown Timer included

LZC-4X: Versatile Top and Side Irradiation model X

- 6 top lamps and 8 side lamps
- 14 UVA lamps and 14 UVC lamps included
- Safety Features include: Safe Exhaust and Safety Goggles
- Installed options include: Recessed Magnetic Stirrer
- Portable Carousel and Portable Turntable
- Power Meter for use with Luzchem LZC-VIS and LZC-UVA lamps

LZC-ORG: Organic Photochemistry model

- 10 side lamps
- 10 UVA lamps and 10 UVC lamps included
- Safety Features include: Safe Exhaust and Safety Goggles
- Installed options includes: Recessed Magnetic Stirrer and Digital Timer
- Portable Carousel, 8 P-Tubes and 8 Q-tubes

LZC-DEV: New Researchers Model

- 4 top lamps and 6 side lamps
- 10 UVA lamps
- Safety Features include: Safety shutdown and Safety Goggles
- Installed options include: Digital Timer
- Power Timer Carousel
- Can be upgraded to LZC-EDU which includes prepared experiments.

For more info see www.luzchem.com/edu

CCP-4V: Computer controlled photreactor

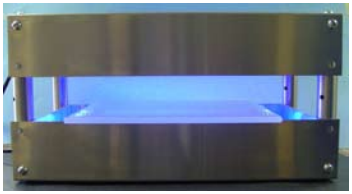
See page 9 for details

See pages 10 through 12 for a broad range of accessories and options.

EXPO PANELS

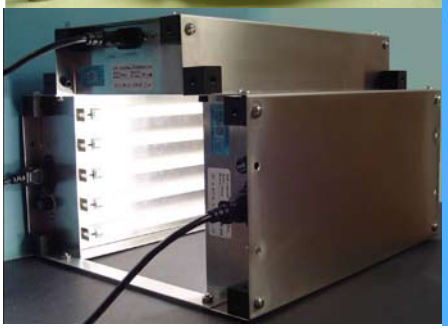
Ultraviolet and visible exposure flexibility.

Expo panels are a cost effective and flexible solution for ultraviolet and visible irradiation, specially designed for customers with unique needs. Each expo panel (8 x 16 x 3 inches) uses five fluorescent lamps providing an emissive area of approximately 7 x 12 inches. All Luzchem or Rayonet 8-watt fluorescent lamps can be used, including UVA, UVB, UVC, visible and 420 nm; panels are supplied with a pair of UV-absorbing safety goggles.



Expo panels allow virtually infinite design flexibility. Use one panel for ultraviolet curing applications, or to irradiate biological samples in Petri dishes. Alternatively, use multiple panels to expose a conveyor belt, or transform an incubator into a photoreactor, or refinish a separate room into an ultraviolet exposure room

Each expo panel has building cubes in its four corners, with 1/4-20 threads, allowing multiple configurations some of which are pictured below..



Luzchem offers a range of options including external shut down digital timers (LZC-TIM-E), acrylic UV-shielding panels and interconnection kits.
Photoreactor tools, such as power meters, spectroradiometers and merry-go-rounds can also be used with expo panels. **See pages 10 thru page 12**

RING ILLUMINATOR

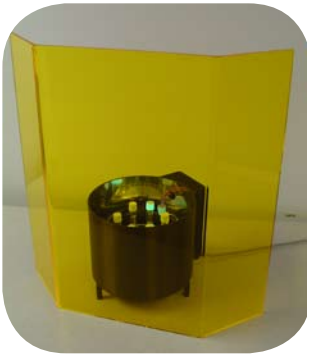
Design for every budget, this tool can be used for either Visible and UVA irradiation.

Ring Illuminator is the perfect tool for occasional irradiation users. It is has a sturdy design. It fits two 22 Watt ring lamps. Supplied with a pair of UV-absorbing safety goggles.
The unit has the option of an installed analog timer. Ideal for side UVA or VIS irradiation, particularly when used with Luzchem's portable magnetic stirrer or portable carousel. This equipment does not generate any harmful ozone.

Order: RING-01 or RING PACK

For UVA or Visible ring lamps:
Order: RING-UVA
Order: RING-VIS

A UV-Shield is recommended for users working with UVA lamps.
Order: UV-Shield



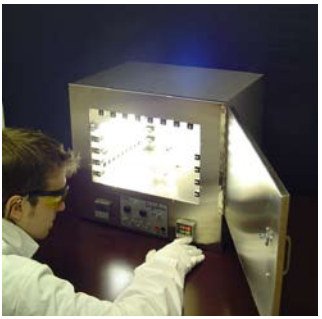
SAFETY FIRST

Invest in UV shields with extra UV protecting goggles. Even UVA lamps can cause extensive eye damage.

ICH Compliance and Photosafety Testing

ICH-Option 2 Compliant Photoreactors (LZC-ICH2)

Certified compliant with ICH guidelines under option 2. Holds eight side and eight top lamps. Includes 16 UVA and 16 visible lamps, power meter, digital timer, carousel, turntable, recessed magnetic stirrer, bulkhead connector for gases, safety goggles and a safe exhaust system. Also included is temperature control from 25 to 45ºC. Certification includes mapping of energy distribution in the chamber.

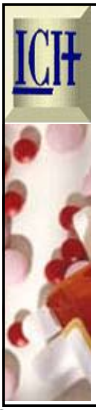


For detailed specifications see www.luzchem.com.

Computer controlled photoreactors (CCP-ICH2)

Certified compliant with ICH guidelines option 2. This computer controlled photoreactor uses a USB interface. It automatically logs exposure conditions. All exposure conditions are controlled from the software and parameters logged include exposure time and exposure dose. Ideal for pharmaceutical testing and any other industry with stringent documentation requirements. It includes UVA and Visible lamps (16 of each), safe exhaust system, a pair of safety goggles, installed drive motor, carousel, turntable and magnetic stirrer.

An ICH primer



Referred simply as the ICH guidelines, this document was prepared by the International Conference on Harmonization of Technical Requirements of Pharmaceuticals for Human Use. The US Food and Drug Administration in the Federal Register published the “Guidelines for the Photostability Testing of New Drug Substances and Products” on May 16, 1997 (p. 27116). The Guidelines recommend illumination delivering 1.2 million lux hours including 200-Watts hour per square meter in the UVA region. Two types of lamps are acceptable; xenon lamps (Option 1) or fluorescent tubes (Option 2). Users “may rely on the spectral distribution specification of the light source manufacturer.” Luzchem’s compliant information is supplied with ICH1 and ICH2 photoreactors.

Computer controlled photoreactors

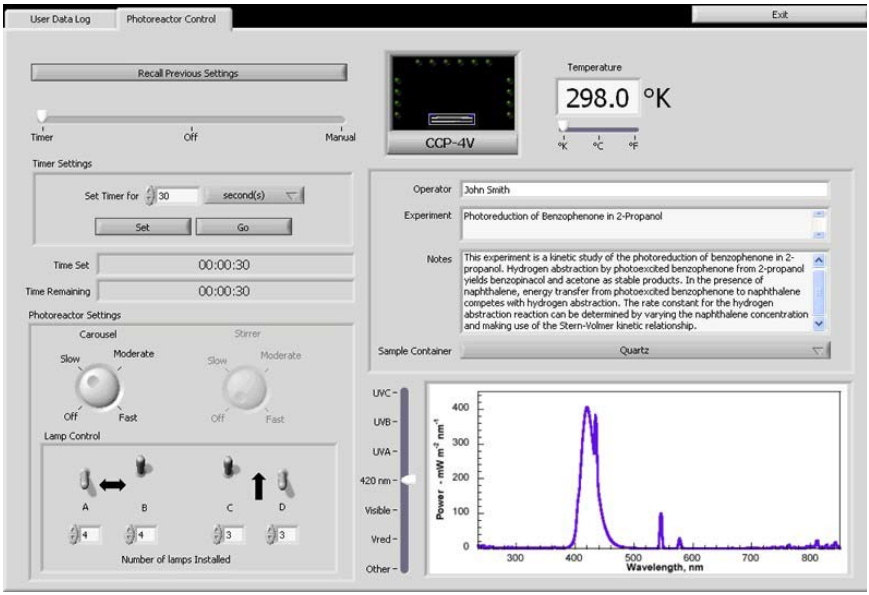
Available in CCP-4V, CCP-ICH2 and CCP-ICH1 models

Luzchem has designed software to make record keeping and audit trails easy. These computer controlled photoreactors use a USB interface. All exposure conditions are controlled from the software and various parameters logged.

Ideal for testing in pharmaceutical or any other industry with stringent documentation requirements.

Logs exposure conditions, such as:

- Users' experiment description
- Configuration and type of lamps used
- User comments
- Exposure time
- Temperature
- Exposure dose



CCP-4V: Computer controlled photoreactor

- Fully computerized using a USB interface
- Software automatically logs exposure conditions
- 6 top lamps and 8 side lamps
- 14 UVA lamps and 14 UVC lamps included
- Safety Features include: Safe Exhaust and Safety Goggles
- Installed options include: Installed Motor Drive and Recessed Magnetic Stirrer
- Carousel and Turntable for use with Installed Motor
- Power Meter for use with Luzchem LZC-VIS and LZC-UVA lamps

Photoreactor options

Environmental chambers

True exposure control:
Temperature, wavelength and atmosphere

Takes substrates up to 8.3 in (21 cm) in diameter and up to 1 in (2.5 cm) deep. Fits in all Luzchem photoreactors. Inert gas and suction ports and temperature control up to 180ºC. Upper limit factory programmable.

Our chambers offer unique flexibility with excellent temperature control, and the possibility of flowing the non-flammable gas of your choice. The cover serves as a cut-off filter. Suction port improves thermal contact for lithographic uses.

Order: LZC-ECDH (closed unit)

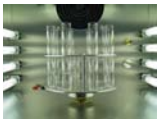
LZC-BK (open unit, temperature control only)

LZC-ECDH-Py Pyrex cover

LZC-ECDH-Q Fused silica cover

FACTORY INSTALLED OPTIONS

Digital Temperature monitor adds a valuable feature to most photoreactors. Monitors the air temperature of flow exiting the chamber. Normally set in Celsius degrees. Order: LZC-TEM



Carousels for up to 16 tubes. Can no be used at the same time as the turntable or magnetic stirrer.
Order: LZC-B

Turntables for solid samples or petri dishes .Can no be used at the same time as the carousel or magnetic stirrer.
Order: LZC-C

Magnetic Stirrer

Recessed magnetic stirrer with adjustable speed can add convenience for synthetic work and for stress tests. Can no be used at the same time as the turntable or carousel.
Order: LZC-D

Digital timer option allowing from a few seconds to 99 hours timing. Automatically shuts off the unit upon completion of the irradiation. Order:LZC-TIM

ADD ONS

Power meter for use with LZC-UVA lamps and any visible lamp. It is calibrated both at 350 nm and in the visible region. An inexpensive monitor for UVA with ±25% accuracy (for use with LZC-UVA only) and visible light output with ± 10% accuracy.
Order: LZC-Z

Safety goggles: UV protecting **safety goggles** with >400 nm cut-off.
Order: LZC-SG
Order: LZC-SG5 for a 5 pack

Well Plate Environmental Chamber supplied with pyrex cover. Perfect for exposing samples to nitrogen during irradiation.
Order: WP-01

Also Available
Replacement pyrex cover for WP-01
Order: WP-PC

Quartz cover for WP-01
Order: WP-QC

UV-Shield for use with Expo Panels and Ring Illuminators. Filters harmful UV radiation from UVA, UVB or UVC lamps.
Order: UV-SHIELD

PORTABLE OPTIONS

Carousels for up to 16 tubes.
Order: LZC-MGR

Turntables for solid samples or petri dishes
Order: LZC-TRN

Portable 12 V magnetic stirrer: . Up to four portable units an fit in the chamber.
Order: LZC-MGS

E**xternal digital countdown timer**.
Compatible with several different products; enables any electrical equipment (110 V or 220 V) to shutdown after prescribed time **Order: LZC-TIM-E**

Photoreactor lamps and filters

Luzchem uses T5 type lamps. They are fully interchangeable in all Luzchem photoreactors (except xenon photoreactors) and with many Rayonet systems. Consult the Luzchem website for the detailed spectral distribution and equivalence with Rayonet lamps.

Part No	Description
LZC-UVA	UVA lamp centered at ~350 nm.
LZC-UVB	UVB lamp centered at ~ 300 nm, with a peak at 313 nm.
LZC-UVC	UVC germicidal lamps, with a strong line at 254 nm. **Note:** Use requires proper ventilation.
LZC-420	Lamp centered at ~420 nm.
LZC-VIS	Cool white fluorescent tubes. Ideal for emulation of office light and for ICH compliance.
LZC-RED	Red sleeve filter. Cuts off at 600 nm. Normally used with LZC-VIS for “red only” irradiation.
LZC-540	Amber filter for VIS bulbs. Cuts out light below 540 nm.

Xenon photoreactors

Luzchem offers three xenon photoreactor models, all based on highly efficient air-cooled 175 Watt ceramic xenon lamps with a 34 Watt radiant output. All models include shutter, safety goggles and filter adaptor. Normally supplied with a full UV lamp with elliptical mirror, several other lamp options are available. Full UV lamps have power from 200 nm into the near IR region. Ozone free lamps eliminate wavelengths below 320 nm and can be vented into the laboratory atmosphere.

UPGRADE: 300 Watt lamp upgrade available.

Suitable for both 110/220 V, 50/60 Hz.

Basic Xenon photoreactor - LZC-XE

As described above. Options include digital timer, diffuser and temperature monitor.

ICH-Option 1 Compliant - LZC-ICH1

Certified compliant with ICH guidelines option 1, includes shutter, timer and filters required for compliance. Every unit is supplied with energy mapping and certification.

Xenon Solar Simulator - LZC-SSR

Includes shutter, timer, filters required for solar simulation and light diffusers to improve homogeneity in the exposure area, Solar spectral data included in the manual.

Now available with three power settings, High, Medium and Low. Medium is factory set to match AM1.5 intensity within 10%.

SUGGESTED COMBINATION: For a package discount and reliable spectral measurements of your photoreactor's output, add a Spectroradiometer to your order.

MSL (Modular Spectroscopy Laboratory), patent pending

Luzchem introduces a new and innovative instrument that will combine the functionality of several instruments into one. Luzchem's MSL, or modular spectroscopy lab, can perform many different types of spectroscopic measurements using shared hardware. Its main unit can include hardware for absorbance, fluorescence, and fluorescence excitation capabilities, spectroradiometry, and thin film analysis. Users can choose the features they currently need and then later expand as their needs change. Diffuse reflectance, chemiluminescence, and bioluminescence kits will be available for purchase in the near future. Its modular design allows flexibility, while the software provides a consistent and user-friendly interface.

FUNCTIONS NOW AVAILABLE

- ABSORBANCE
- FLUORESCENCE
- FLUORESCENCE EXCITATION
- SPECTRORADIOMETRY
- THIN FILM ANALYSIS

The MSL allows the user to switch between different types of measurements quickly and easily. Users are able to switch between fluorescence and absorbance measurements at the touch of a button.

The multi-user, database-driven software makes the MSL ideal for use in the lab. It allows the user to overlay different types of measurements quickly and easily. No longer do you need to use separate software to compare results from two different instruments. The MSL software allows the user to import spectra from other instruments, analyze the spectra, perform calculations, and store them in the MSL database for future use.

The MSL is the ultimate solution to time and space constraints in the lab. The easy-to-use software ensures that users can efficiently obtain and analyze results, while its small footprint takes a minimal amount of table space.

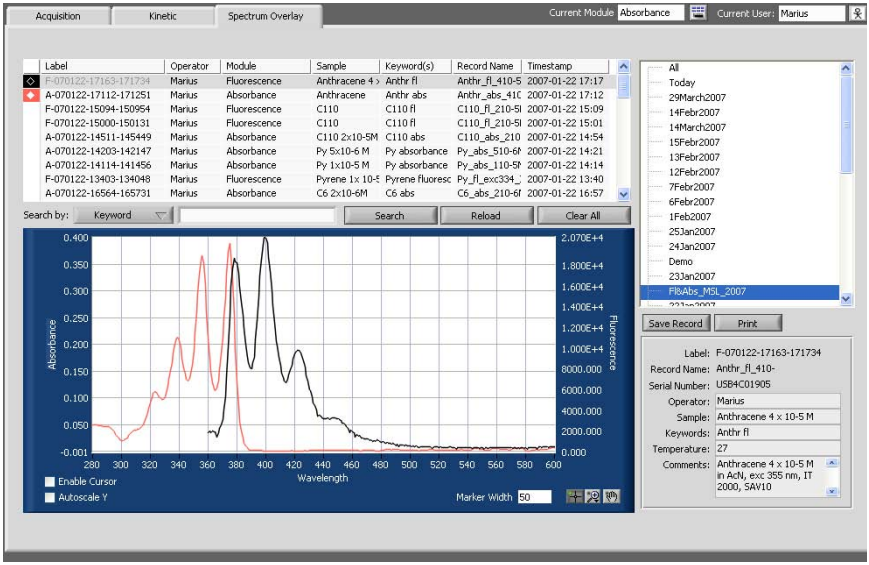
Dimensions of 24 inches by 12 inches by 8 inches high.

MSL - Fret capabilities

Designed for clients who require absorbance, emission (fluorescence) and fluorescence excitation. Can be expanded to include all other MSL capabilities

Measurement of absorbance (transmission) for liquid samples in the 230-850 nm range and of fluorescence (or emission of any kind) in the 300-850 nm range. It allows both spectroscopic and kinetic measurements.

Proprietary data storage techniques allows for fast easy sharing, retrieval and display of thousand of spectra, with intuitive overlays and simple spectrum arithmetic functions.



MSL screenshot: Spectrum Overlay Feature

Xenon Illuminators

Cost effective and powerful xenon illumination

175 W or 300 W xenon source (LUZ-XE, LUZ-XE/S or LUZ-XE300/S)

Luzchem's xenon illuminator uses state-of-the-art ceramic lamp technology to achieve a 34 Watt radiant output (175 W bulb). This self-contained, air cooled unit has three versions: (a) full UV spectrum, (b) filtered (cut off at 320 nm) ozone-free, and (c) hot filtered allowing only the visible region. We also offer collimated or focused output, the latter being ideal for fiber optic coupling. Changing the lamp and housing from focused to collimated output only takes a few moments.

Model **LUZ-XE/S** incorporates built-in shutter controlled either manually or by a computer generated TTL level. Shutter prevents burning of fiber end when used with a focused lamp and fiber optic coupling.

OPTION: Now available with three power settings, High, Medium and Low.

Cermax 175 W Xenon Lamps

Note: Part # refers to xenon bulbs only
Cermax 175 watt xenon lamp: Standard replacement part for LFP-111 is LFP-XE
Lifetime 1000 hours: warranty: 500 hrs..

Xenon bulbs & Housings	Parallel	Focused
Full-UV output	XE175BUV	LFP-XE
Ozone free	XE175BF	XE175B-10F
Housing (lamp sold separately)	HOUSING-P	HOUSING-F

Lamp housing includes heat sink necessary for heat dissipation. Allows the user to efficiently alternate between two different lamps when necessary. Housings for parallel and focused lamps are not interchangeable.

Luzchem's Patented Laser Flash Photolysis system

What is different about Luzchem's LFP systems?

- Patented: U.S. Patent No. 6,741,347 and UK patent No. 2,358,244
- Small footprint makes it portable
- Powerful ceramic xenon lamp allows efficient fiber coupling and instrument miniaturization
- Lamp pulsing is unnecessary and the system is air cooled
- Time scales available start at a few nanoseconds, but extend to seconds
- Other advantages of the use of a CW lamp include longer lamp lifetime, better signal baselines, and a more linear detector behavior.
- Synchronization with the laser is always perfect and jitter-free, it is so advanced that the system performs well even with no physical connection between laser and LFP instrument
- Powerful software allows full control and optimization of operating parameters

Standard components in all systems

- Ceramic xenon light source
- 125 mm monochromator
- Tektronix digitizer (Model varies)
- Compact photomultiplier
- Power supply
- Cell holder
- Fiber optic connectors
- Computer, monitor and backup drive
- Fiber optic sensor for laser-sensing pre-trigger signal
- Computer interfaces and software
- User-configured spectral range (factory set)
- Variable temperature option available

Note: Luzchem LFP systems do not include the laser.

What else do you need once you buy the LFP-111?

- a nanosecond laser (ask us for advice)
- a safe exhaust for traces of ozone from the xenon lamp

LFP models

Transient absorption

Model LFP-111

Developed for spectroscopic and kinetic laser flash photolysis measurements. The LFP-111 includes all standard components plus a temperature monitor and a Tektronix digitizer TDS-3000 series with 300 MHz bandwidth. The LFP-111 instrument does not include the laser, but generates 5 volt trigger pulses suitable for most lasers, including the two-pulse sequence required for YAG lasers (flash lamps and Q-switch), with programmable frequency and delay. There are three different monitoring ranges available. From 200 - 780 nm, 300 - 880 nm or 330 - 880 nm.

Model LFP-212

Includes all standard components (Tektronix digitizer TDS-2000 series with 100 MHz bandwidth). There are three different monitoring ranges available. From 200 - 780 nm, 300 - 880 nm or 330 - 880 nm. Connects through a USB connection.

Diffuse Reflectance

Model LFP-222

Laser photolysis transient diffuse reflectance spectrometer for spectroscopic and kinetic absorption measurements. It includes all standard components and a Tektronix digitizer TDS-2000 series with 100 MHz bandwidth. Connects through a USB connection.

Dual Capability: Transient absorption & Diffuse Reflectance

Model LFP-212/222

Dual Capability: laser photolysis transient absorption and diffuse reflectance spectrometer for spectroscopic and kinetic laser flash photolysis measurements. It includes: all standard components and two ceramic xenon light sources. The digitizer is a Tektronix TDS-2000 series with 100 MHz bandwidth.

Recommended maintenance kit. Includes two Xenon lamps, one shutter blade, one 1000 micron light delivery fiber, one laser trigger fiber replacement, one replacement temperature sensor and various fuses. **Order: LFP-MAIN**

LFP-111 specifications

Footprint:
12 x 18 inches (30 x 45 cm)

Time response and time scales:
Detector ~3 ns rise time
Digitizer 300 MHz (2.5 GHz sampling)
Long time scales: lifetimes of hundreds of milliseconds, even seconds, readily performed.

Spectral Range:
Variable depending on the grating selected by customer. With recommended grating: 230-750 nm. Optional amplifier can be used to extend this region.

Sample Holders:
For ambient temperature studies. Holds 10 x 10 mm cells.
Optional adapter for 7 x 7 mm cells (Order Part LFP-SH7) and for round tubes (Order Part LFP-SHQ).
Optional Temperature Control Sample Holder for 10 x 10 mm cells; 5°C to 60°C (Order Part LFP-VT)

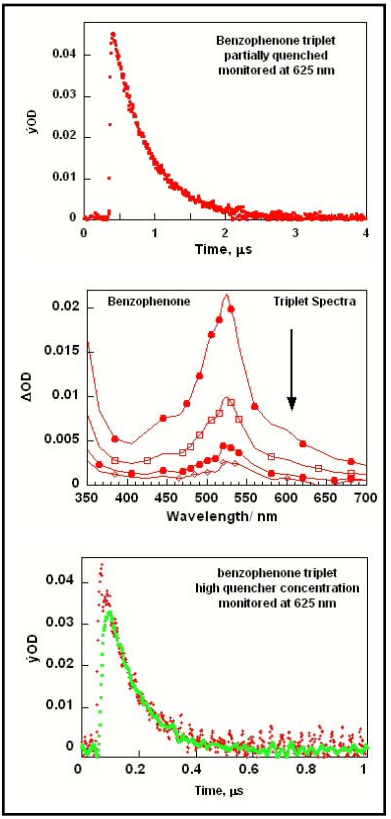
Light Source:
Ceramic 175 W xenon lamp coupled to fiber optic cables.

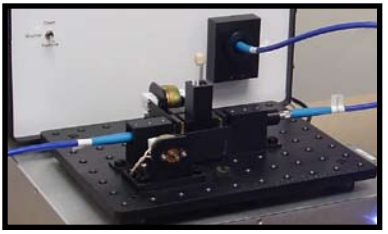
Triggering:
Optically synchronized

Temperature monitor:
A semi-conductor chip monitors the temperature in the sample compartment.

Computer interfacing:
The LFP-111 and digitizer are connected to the computer via GPIB and serial interfaces (supplied) that control all experimental parameters.

Computer and software:
Supplied with a computer operating under Windows and all the necessary interfaces. The software package has been developed in the LabVIEW environment. Data from the LFP-111 can be easily exported in ASCII format to meet your requirements.





LFP-111 detection platform

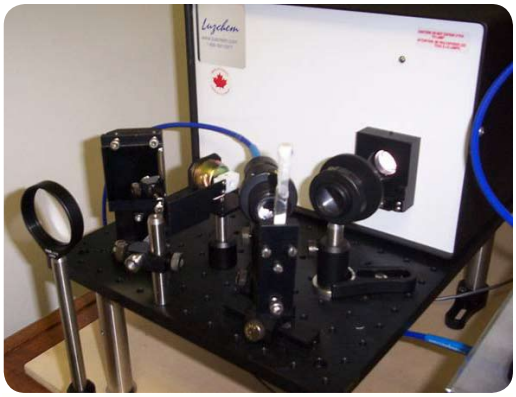
Time resolved diffuse reflectance

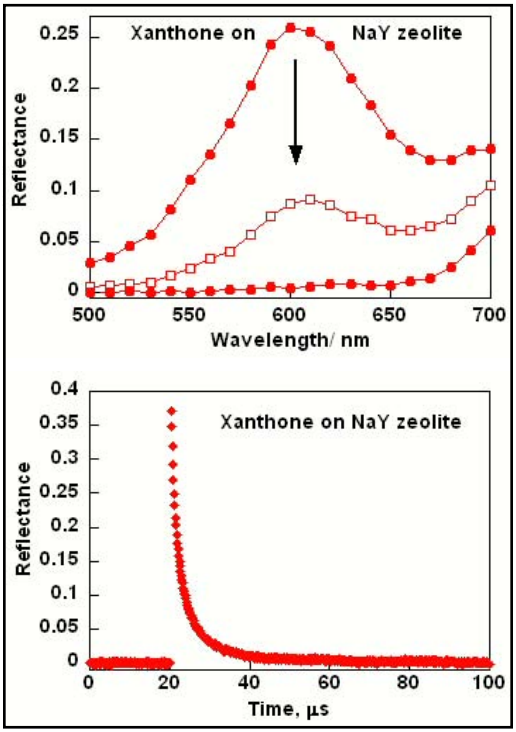
Luzchem's LFP-222 is capable of time resolved diffuse reflectance detection allowing the use of laser flash photolysis for the study of opaque light scattering samples.

Luzchem's diffuse reflectance is available as a stand-alone technique or in a combination with transmittance laser flash photolysis systems. The optical system has been designed to maximize the solid angle for signal collection and affords exceptional signal quality.

In the examples included in this page a 3 mJ pulse at 337 nm was used to excite xanthone (3%) on silica gel to achieve a 24% reduction in reflected light, due to the xanthone triplet state, an exceptional signal for such low excitation power.

Uses 3x7 cells part number SC-37S.





LFP options

BUILT IN OPTIONS

UV-VIS spectrometer, integrated into LFP system including basic software. Measures steady state spectra of sample before or after LFP experiment, over the 240-850 nm range, without moving the sample from the holder.
Order: LFP-UV_VIS

ADD ON OPTIONS

Variable temperature option, for sample compartment of LFP. Must be factory installed. 5ºC to 65ºC:
Order: LFP-VT

Amplifier for LFP-100 series, Amplifies PMT output for signals with life-times 40 ns and longer. Allows expansion of spectral detection range.
Order: LFP-AMP

Recommended maintenance kit. Includes two Xenon lamps, one shutter blade, one 1000 micron light delivery fiber, one laser trigger **f**iber replacement, one replacement temperature sensor and various fuses.
Order: LFP-MAIN

Temperature monitor capabilities, includes sensor, interface and software to read/record tempature.
Order: LFP-TMO

7 x 7 Sample holder Sample holder for 7 x 7 cuvettes
Order: LFP-SH7

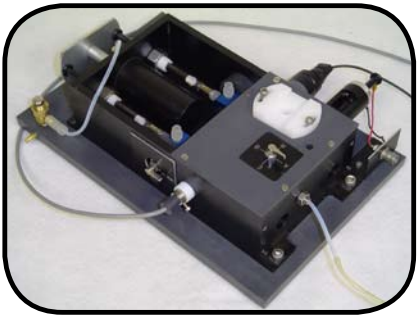
Q-tube Sample holder Sample holder for Q-tubes
Order: LFP-SHQ

Stopped flow systems

Stopped flow option for LFP. Rapid kinetics made easy and affordable

The stopped-flow option, SFA-X, adds capabilities to Luzchem's laser flash photolysis systems models LFP-111 and LFP-212. This accessory takes advantage of the components already used to monitor laser flash photolysis signals (ceramic xenon lamp, monochromator, photomultiplier and other hardware) to result in a powerful, yet cost-effective rapid kinetics stopped-flow apparatus. Luzchem's state of the art analysis software allows a seamless integration with Luzchem's applications for laser flash photolysis and diffuse reflectance. The stopped-flow SFA-X is based on proven TDI technology. The instrument is easily coupled with optical fibers to the xenon lamp and detection system. An electronic shutter built into the xenon illuminator limits light exposure to only the monitoring period.

Standard capabilities include transmission measurements in the 250 to 710 nm range using a 15 mm path cell, and mixing times below 2 milliseconds. The instrument electronics allow data collection in the submicrosecond time scale, and responses are only limited by mixing time. Temperature control is available as an option.



The SFA-X stopped-flow option can be either factory installed, or retrofitted to older laser flash photolysis systems.

Optical Accessories

Shutter for laser and lamp beams: Operated with 24 volts DC, this simple shutter offers convenience in a durable product. It can be provided with a black anodized or scattering clean aluminum blade and either with or without a breadboard mounting plate.

For Complete Shutter Order Part: **OA-LS-T**

For Shutter without breadboard mounting bracket Order Part : **OA-LS-W**

Replacement blade for shutters (black) Order Part **OA-SBB**

Replacement blade for shutters (reflecting) Order Part **OA-SBR**

Electronic shutter controller. Controls up to three Luzchem shutters, either manually or via TTL signals. Includes cables for 3 shutters. Also provides a 24 VDC output. Order Part **OA-LS-C**

Fibers

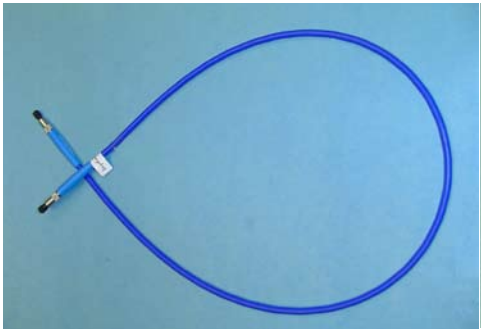
Silica fiber: We can make SMA fiber patch cables to meet your needs. Below are our standard fibers: Contact Luzchem for details on custom needs.

Monitoring fiber 1000 micron with SMA connectors. 5 meter length
Order Part **LFP-MF_5**

Monitoring fiber 1000 micron with SMA connectors. 2 meter length
Order Part **LFP-MF_2**

Monitoring fiber 1000 micron with SMA connectors. 1 meter length
Order Part **LFP-MF_1**

Monitoring fiber 1000 micron with SMA connectors. 0.5 meter length
Order Part **LFP-MF_H**



Optical Filters

Holmium oxide glass filter for spectrometer calibration, mounted on a 12x12 mm frame to fit most spectrometers	SCC-HO
Didymium oxide glass filter for spectrometer calibration, mounted on a 12x12 mm frame to fit most spectrometers	SCC-DY
Cylindrical cell suitable for use with liquid filter solutions, 10 mm optical path, 22 mm dia., vol. 2.8 ml, with Teflon stopper	SCC-01-85
Cylindrical cell, suitable for use with liquid filter solutions, 50 mm optical path, 22 mm dia., vol. 14 ml, with Teflon stopper	SCC-01-87
Hot filter transmitting only visible light (400-720 nm), 25 mm diameter, suitable for use with Luzchem or Cermax xenon illuminators or by itself (includes clip for lamp mounting)	XE-HF
Red filter for use with LZC-VIS lamps; cuts out light below 600 nm	LZC-RED
Filter for use with LZC-VIS lamps cuts our light below 540 nm	LZC-540

Xenon Illuminator Accessories

Part No.	**Description**	**Thorlabs Compatible**
XE-F	**Fiber optic coupling**	**N/A**
XE-L	**Stackable Lens and filter holder** for 1 inch circular lenses	**Yes**
XE-R	**Lens Retaining Ring**	**Yes**
XE-FH	**Filter holder** for 2 inch square filters	**Yes**
XE-KIT	Includes 2 lens or filter holders (XE-L), 1 filter holder (XE-FH) and one fiber optic coupling (XE-F), 1 Lens Retaining Ring (XE-R), 5 extra placement screws	**See above**

Luzchem Software Products

LFP SOFTWARE

Spectral processing software. Works with files created by Luzchem's LFP system, allowing recovery of spectral data in after-acquisition selected time windows, and to extract kinetics from the spectrum files.

Kinetic Processor. Off-line data processing for kinetic analysis of LFP files.

LFP acquisition software. Version 3.0 now available.

TFA SOFTWARE

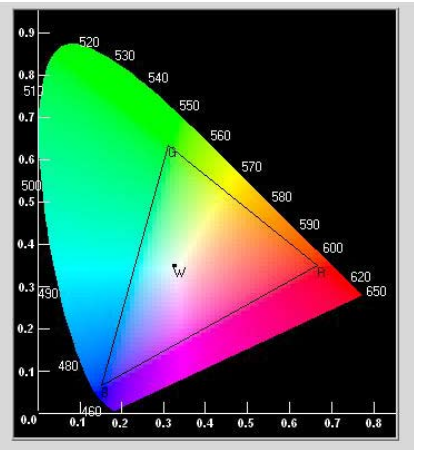
Thin film analysis, acquisition and analysis software. Version 2.1 coming soon, with many upgrades, including a 100 times faster thickness analysis by shape-fitting of the interferogram.

Thin film analysis reader software. Allows extraction of thickness analysis files from dissolution data files.

SPECTRORADIOMETER SOFTWARE

Spectroradiometer, acquisition and analysis software. Version 2.0 coming soon.

Advanced colour analysis software. Version 1.0 available. Analyze spectral data for colour values including CIE chromacity coordinates, Lab, LCH and colour temperature.



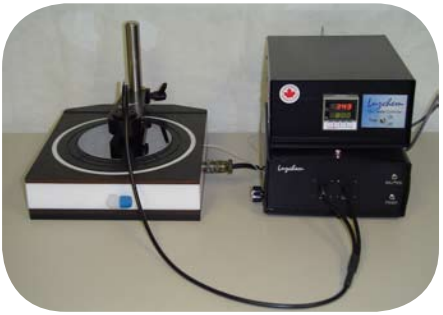
Lithographic equipment

Luzchem's Patented Thin film analysis products
An integrated approach for thin film dynamic metrology (TFA-11)

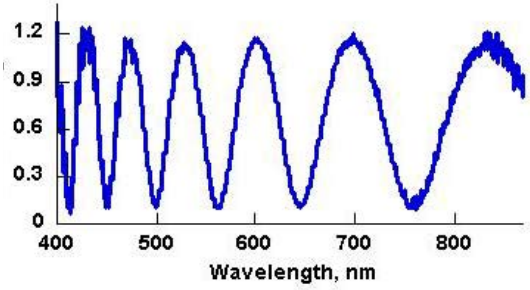
- Film thickness from 60 nm to over 20 microns
- Dissolution rates with multiple sampling spots per wafer
- Temperature control up to 180°C
- Thickness changes during pre- or post-exposure bake
- Solvent loss and deprotection studies.
- Crosslinking effects on film thickness
- Curing kinetics

Specifications/ Highlights

- 110/220 V, 50/60 Hz
- USB interface
- Multi-wavelength detector
- 3648 diode array detector
- Min. 400-850 nm range
- Minimum developer usage
- Outstanding mechanical stability
- Temperature control to 180°C
- Easy-to-learn LabVIEW software
- Reflective or transparent substrates



Just thickness?
Ask us about our model TFA-10 or our MSL option for film thickness. The TFA-10 is the best cost effective solution in the market, and fully expandable to full capacity models.



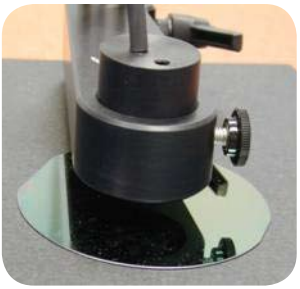
Luzchem's TFA-11 instrument combines the power of interferometric measurements of dry and wet thin film thickness with a versatile, cost effective dissolution rate monitor.

Luzchem's patented design requires only 1 ml of developer. Multiple measurements are possible in a single wafer; typically 4 in a 3 inch wafer and over 30 in an 8 inch wafer. Select any wavelength between 400 and 850 nm, or use the multiwavelength analysis available in our software package. Measures thickness from about 60 nm to over 20 µm.

TFA-10	Thin Film Analyzer measures only film thickness
TFA-10U	Upgrade for the TFA-10 to a dual capability unit TFA-11
TFA-11	Thin Film Analyzer measures both film thickness and dissolution rates
TFA-11CT	Controlled Temperature Thin Film Analyzer. Up to 180°C.
TFA-LMP	Set of 5 TFA lamps (10 W, 12 V) and a pair of handling gloves.
LZC-1	8 Lamp photoreactor configured for top irradiation only. Ideal for polymer and lithographic applications. Recommended option: digital timer. Lamps sold separately.
LZC-BK	Wafer baking and disc heater, for up to 8-inch wafers and temperatures up to 180 C. Includes temperature control unit.

Using too much developer?

If you are using liters of developer to measure dissolution kinetics, and waiting for temperature stabilization, consider Luzchem's TFA-11 system. Its patented design requires less than 1 ml of developer and allows multiple measurements in each wafer (up to 30 in an 8-inch wafer). This cost effective solution will reduce time, developer usage and environmental waste.

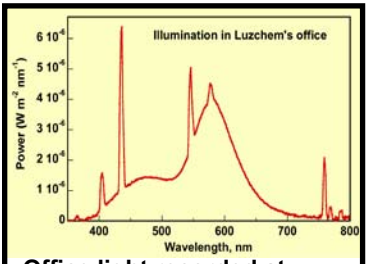


TFA-11 detector head. Multiple dissolution measurements per wafer

UV-visible Spectroradiometer

Luzchem's spectroradiometers are suitable for a wide range of applications, including photobiology research, drug photostability testing, environmental dosimetry and curing applications. These NIST-traceable instruments for the 235-850 nm or 235-1050 nm region. Data are based on a 3640 or 4096 element diode array detector, an integrating acquisition detector with fiber optic connectivity, easy to use LabVIEW software and a convenient USB interface.

SPR-4001



Office light recorded at Luzchem offices using the spectroradiometer SPR-4001

Luzchem's spectroradiometers allow for variable integration times, from 1 ms to one minute, Data can be displayed as raw intensity or as a power spectrum (mW m^{-2} nm^{-1}), using either the NIST-traceable calibration provided, or a user-generated calibration file. The display includes graphic data as well as integrated spectral ranges, UVA, UVB, UVC, visible and a user selected spectral window. In the time acquisition mode the SPR-4001 SPR-4002 and SPR-03 display real time data and stores full spectra at user-selected intervals. Data are easily exported to common spreadsheet or graphic applications. A powerful and affordable tool.

Specifications

	SPR-4001	SPR-4002	SPR-03
Spectral Range	235-850 nm	235-850 nm	235-1050 nm
Power Requirements	2 AA batteries for verification lamp	none	2 AA batteries for verification lamp
Interface	USB	USB	USB
Detector	3648 element CCD detector with 600 lines/ mm grating blazed at 400 nm, including order sorting filter.		4096 element CCD detector
Data output	At 1 nm intervals	At 1 nm intervals	At 1 nm intervals
Data logging	From 1/10 of a second to days		
Data export	Tab separated ASCII, fully compatible with Excel and other graphical and spread sheet programs		
Resolution	Approximately 1 nm	Approximately 1 nm	Approximately 1 nm
Verification	Low pressure mercury lamp	none	Low pressure mercury lamp

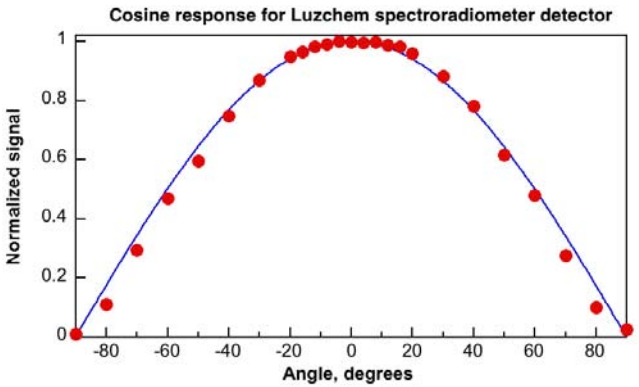
Part #	Description
SPR-4001	NIST-traceable spectroradiometer measures power distribution in the 235-850 nm region. A built-in verification lamp allows for rapid end-user check of the wavelength calibration. Allows for variable integration times from 1 ms to 60 seconds, acquire and save data at user-selectable intervals. Detector head on a 1 meter fiber connector can reach tight spots.
SPR-4002	Similar to SPR-01, this spectroradiometer is a robust self-contained unit. Recommended for sunbed and environmental monitoring.
SPR-03	Measures power distribution in the 235-1050 nm region. Includes a built-in verification lamp. Allows for variable integration times from 1 ms to 60 seconds, acquire and save data at user-selectable intervals. User friendly Labview software. USB interface. Detector head on a meter fiber connector can reach tight spots.
SPR-CAtt	Calibrated PTFE attenuator. New calibration file provided (does not affect the Luzchem supplied calibration)
SPR-UAtt	Uncalibrated PTFE attenuator (50x50 mm)

Luzchem offers spectroradiometer calibration services.

COSINE DEPENDENCE

A good integrator for spectroradiometry must follow a cosine dependence with the angle of incidence of light on the detector. The angle of interest measures the deviation from normal incidence. Luzchem spectroradiometers have exceptional performance, even for angles near 90 degrees, as illustrated in the figure below, where the normalized signal corresponds to the integrated flux between 400 and 700 nm and the blue line is the expected theoretical response. The cosine dependence was measured using a NIST traceable 200 Watt QTH calibration lamp.

SPR-4002



Quartz spectroscopy supplies

Cost effective cells; a great solution for laser flash photolysis, diffuse reflectance and florescence.

A Spectrometer cuvettes designed for laser photolysis work, but suitable for most types of spectroscopy, including fluorescence and NIR work. The optical path has a tolerance of 2% and the walls are 0.9 mm thick for 10 mm cells and 0.7 mm thick for 7 mm cells. A low cost option for spectroscopic studies where 2 % fluctuations in optical path are not critical. Ideal for use under inert atmospheres.

Size, mm	Length, mm	Top	Part No
10 x 10	130	7 mm tube	**SC-10L**
10 x 10	80	7 mm tube	**SC-10S**
7 x 7	130	7 mm tube	**SC-07L**
3 x 7	80	7 mm tube	**SC-37S***

*Recommended for time-resolved diffuse reflectance

Precision UV quality fused silica spectroscopy cells

B Made of UV-quality fused silica, with flat windows and less than 0.2% tolerance. Ideal for demanding fluorescence and absorbance work, including DNA studies. Excellent optical properties down to 190 nm. The optical range is 190 nm - 2.5 micron. Over 100 types available, selected units are listed below. See www.luzchem.com/products/spectroscopy.html.

Part No	Size, mm	Description
SSC-01-4	10 x 10	Standard cell with lid.
SSC-01-14	10 x 10	Absorbance cell with teflon stopper.
SSC-01-104	10 x 10	Standard cell with round bottom and lid
SSC-01-204	10 x 10	Standard fluorometer cell with 4 optical windows & lid
SSC-01-214	10 x 10	Fluorescence 10 x 10 mm cuvettes with four optical windows and teflon stopper
SSC-01-404	10 x 10	Standard cell with stopper and level bottom

Quartz Labware

Luzchem Labware is ideal for synthetic or photostability work. Made of commercial quartz with excellent transmittance above 230 nm. Many sizes and accessories are available. Contact Luzchem for additional information.

Description	Volume	Order
Erlenmeyer with 24/40 joint	100 ml	QL-EFJ100
Erlenmeyer with 24/40 joint	250 ml	QL-EFJ250
Flask with 24/40 joint (flat bottom)	100 ml	QL-BFJ100
Flask with 24/40 joint (flat bottom)	250 ml	QL-BF250
Flask with 24/40 joint (flat bottom)	500 ml	QL-BFJ500
Pack of 50 quartz tubes 14 mm OD, 12 mm ID, 100 mm long, approximate capacity 10 ml	10 ml	Q-TUBES_50
Pack of 8 quartz tubes 14 mm OD, 12 mm ID, 100 mm long, approximate capacity 10 ml	10 ml	Q-TUBES
Reverse immersion well	100 ml	QL-R1W

Pyrex Supplies

Ideal for use where transmittance below 320 nm is not required.

Pack of 16 pyrex tubes 14 mm OD, 12 mm ID, 100 mm long, ideal for Luzchem carousels	10 ml	P-TUBES
Pack of 16 replacement screw caps for P-TUBES	--	P-CAPS

Luzchem

Shedding light on new ideas

Areas of application

Photochemistry
Photobiology
Drug photostability
UV curing
Ultraviolet disinfection
Time resolved spectroscopy
Kinetics and mechanisms
Reactive intermediates
Nanostructures
Polymer thin films
Coatings
Microlithography
Radiometry
Solar simulation

Luzchem Research Inc.

5509 Canotek Road, Unit 12
Ottawa, ON K1J 9J9
Canada

Phone: 613-749-2442
Fax: 613-749-2393
Email: sales@luzchem.com
www.luzchem.com