Liquid Waveguide Capillary Cells

Absorbance measurements with up to 500-fold increase in sensitivity

WPI U.S. Patents 5,444,807, 5,570,447, 5,604,587.

Microliter sample volumes — exceptional sensitivity

WPI's **Liquid Waveguide Capillary Cell (LWCC)** is a flow cell for absorbance measurements in the ultraviolet, visible and near infra-red ranges. Pathlengths range from 50–500cm, with increasing measurement sensitivity from 50 to 500-fold. The flow cells are fiber coupled and have a very small sample volume ranging from 125μL (50cm pathlength) to 1,250μL (500cm pathlength).

How does it work?

The sample solution is introduced into the **LWCC** at the liquid input. Light is coupled into the **LWCC** from a light source via a fiber optic cable. After passing through the **LWCC**, light is collected with an optical fiber and guided to a detector. The concentration of the sample is determined by measuring its absorbance in the **LWCC**, similar to a standard UV/VIS spectrometer.

	Pathlength (cm)	Internal Volume (μL)	Wavelength Range (nm)
LWCC-3050	50	125	230–800
LWCC-3100	100	250	230–730
LWCC-3250	250	625	250–730
LWCC-3500	500	1250	280–730

Advantages of LWCC over standard cuvettes

Ultra-sensitive absorbance measurements can be performed in the UV, VIS, and NIR portion of the light spectrum. Compared with a standard 1cm cuvette, a 1mAU signal is enhanced 100-fold to 100mAU when using an LWCC-3100. LWCC units can be directly connected to a pump, a fluid injection analysis system, or even filled with a syringe.

Detector requirements

Based on fiber optics, the **LWCC** is designed for use with WPI's **LEDspec** (biophotometric detection system), **Tidas I, Tidas 100** and **Tidas E** spectrometer systems. The LWCC can also be interfaced to any CCD, PDA or scanning type optical spectrometer or photodiode detector with fiber optic input capabilities. WPI also offers a range of light sources, such as **FO-6000** (VIS/NIR studies) and **D4H** (UV/VIS) which can be used in conjunction with the **LWCC**.

Wavelength range

Designed to work in the UV, VIS and NIR, the **LWCC's** optical performance is strongly dependent on the solvent used in the wavelength of interest. Please note that in aqueous solutions the wavelength performance is limited (see Efficiency Curves).

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LWCC SPECIFICATIONS

	LWCC-3050	LWCC-3100	LWCC-3250	LWCC-3500
Optical Pathlength	50cm	100cm	250cm	500cm
Internal Volume	125µL	250µL	625µL	1250µL
Fiber Connection	500µm SMA			
Transmission @254nm*	20	10	5	-
Transmission @540nm*	35	30	25	20
Noise [mAU]**	<0.1	<0.2	<0.5	<1.0
Maximum Pressure	100 PSI			
Wetted Material	PEEK, Fused Silica, PTFE			
Liquid Input	Standard 10-32 Coned Port Fitting			

* Referenced using coupled 500µm fibers
** Measured using ASTM E685-93
*** A one-meter waveguide of 550µm internal diameter requires approximately 1.5PSI for water flow of 1.0mL/min.

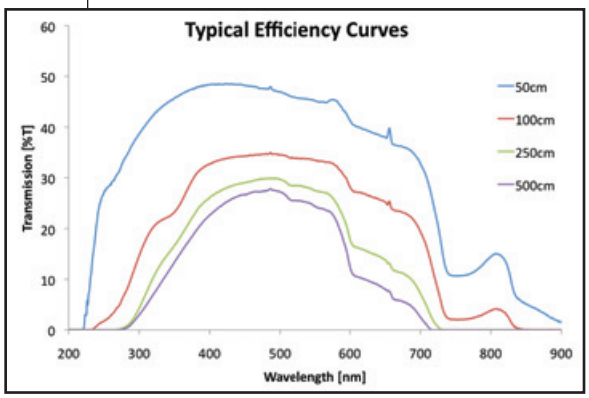
Linearity

By Beer's Law, the absorption of a liquid sample in **LWCC** bears a linear relationship to the concentration of an analyte. A linear relationship is observed between 0.01–2AU and is limited only by stray light and noise from the spectrometer.

Chemical resistance

Any chemicals that could react with PEEK, Polyimide and fused silica should not be used in **LWCC.** (If in doubt, please contact WPI for details.)

These spectra show the optimal detection limits for LWCCs of varying pathlength.



Applications

Applications include liquid chromatography detection, stopped-flow injection, flow-injection analysis, gas-segmented continuous flow analysis and water monitoring (environmental, oceanic, and drinking water). Please contact WPI to discuss your needs.

References

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