

Colorimetric Flow Cells - from 100 microns to 50 Centimeters

Conventional FIA/SIA systems typically utilize 1 cm optical path flowcells, and granted, for many applications this works well. However, when working with very low level analyte concentrations, for instance in the parts per billion range, a long path flowcell becomes a necessity.

On the other extreme, some "optically dense" assays either require very short optical paths or additional dilution steps, including many methods based in the UV region, as well as measurements of industrial dyes. Not having to dilute the sample prior to measurement saves on time and also can produce less waste. This is especially important for monitoring online industrial applications.

Long Path Flowcells (50 + cm)

The well known Teflon AF based liquid core waveguide (e.g., see <http://www.oceanoptics.com/products/lpc1lpc5.asp>), is available up to 5 meters, is compact, and works well for many applications. However there are a few drawbacks. For instance:

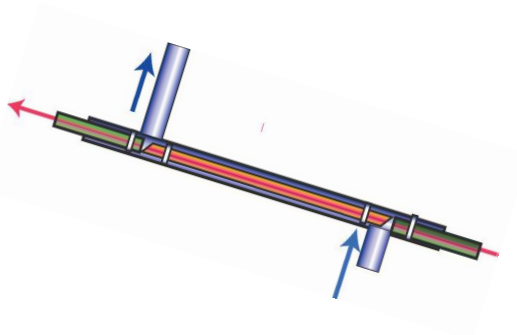
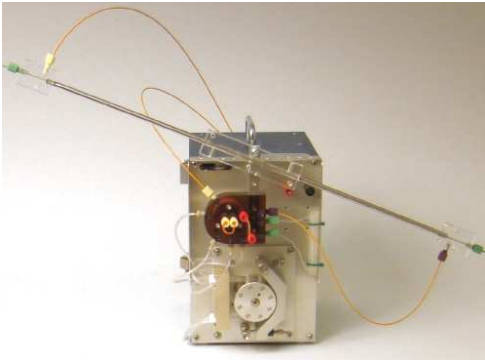
"Analogous to an optical fiber, a typical LCW is a tube (cladding) with a refractive index (RI) lower than the RI of the fluid (core) inside it. Light propagates through the fluid core by total internal reflection. The cladding can be altered by gases and chemicals absorbed into it, thereby degrading the optical performance." Dallas T. and Dasgupta P.K. TrAC, 23, 385 (2004)

An alternative is the new 50 cm FIAlab LP Flow Cell-50 (http://www.flowinjection.com/Brochures/sma_ULP.aspx). The flowcell is not based on Teflon AF and is not a liquid core waveguide in the true sense, but rather works by the specular reflective nature of the inner tubing. The inner diameter is 0.75 mm (0.50 mm also available), which gives a total internal volume of ~230 microliters (~100 microliters for the 0.5 mm ID version). Degradation by reagent contamination is not an issue and the flow cell inner lining tube can be easily replaced by the user at a very little cost.

The 50 cm flow cell has been successfully used for low level phosphate, nitrate, nitrite, ammonia assays, and its 10 cm version for high throughput phosphate assay at 360 samples/hour..

Analyte	Typical Detection Range
Nitrite	0.0001 to 0.5 mg (N)/L
Nitrate	0.0004 to 1.0 mg (N)/L
Ortho Phosphate	0.002 to 0.5 mg (P)/L
Ammonia (Salicylate Method)	0.002 to 2 mg (N)/L NH ₃

www.flowinjection.com



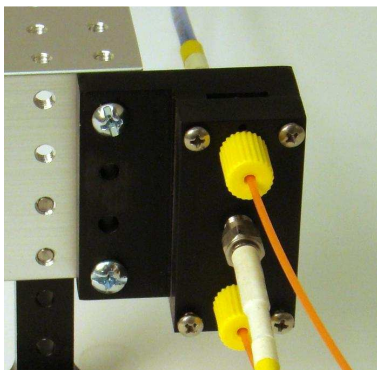
FIAlab's Long Path 50 cm flowcell shown above mounted to the FIAlab-2500 FIA system

Short Path Flowcells (< 2 mm)

The new SMA **Ultra-Short Path Flowcell** allows absorbance measurements through an optical path length as short as 100 microns. The maximum path length available is 2000 microns.

The SMA-USP flowcell is ideal for measuring the UV/VIS/NIR (170 to 2700 nm) absorbance of optically dense fluids. Eliminates or minimizes the need for pre-dilutions during online monitoring. Wetting surfaces are Fused Silica and Teflon making this flowcell compatible with a host of chemicals including various types of weak to moderate bases, acids and solvents. Connects to fiber optics with SMA terminations.

Multiple "channels" are also available, where various optical paths must be utilized simultaneously. This is often required when measuring different components from a single source. For instance when measuring textile dyes with different color components of varying concentrations.



SMA-USP Flowcell



SMA-USP-4-Chan Flowcell

Please contact FIAlab (fialab@flowinjection.com) for additional information.