WHAT EVERYONE NEEDS TO KNOW ABOUT LONG PATH GAS CELLS

WHAT PEOPLE DO NOT KNOW ABOUT LONG PATH GAS CELLS

The most popular version of the long path gas cell is the "White Cell" reported by John U. White in J. Opt. Soc. Amer. in May 1942. Today the "White Cell" is manufactured by several suppliers in the U.S., UK, Japan, etc. of various cell body and mirror materials and coatings. But they are not all alike in performance; in fact all are different.

The most important characteristic of a high performance long path gas cell is its net energy throughput, since that feature determines the signal to noise ratio and the ultimate sensitivity of a White cell when used with a spectrometer (typically a FTIR spectrometer).

While the design and material construction of a White cell are relevant to the intended application, it is the specifications for the three-mirror set of the White cell that are the most critical to the performance. The performance or net energy throughput is determined by the quality control of the mirror substrate material, the radius of curvature and the surface finish of the spherical mirror surface, and the structure and composition of the reflective coating, which is generally gold for the infrared region.

Most manufacturers do not release the details of their mirror specifications, so one cannot select a supplier of a White cell based upon such a listing. One has to either try different cells or rely on word-of-mouth to secure the cell that best matches the application and the price range.

Prices of White cells vary widely depending upon the materials of construction, the country in which they are fabricated, and the suppliers' assessments of their quality and performance. Generally speaking, a gas cell made of glass with glass mirrors will be less expensive than a cell made of Nickel-coated Aluminum with glass or aluminum mirrors which will be less expensive than a stainless steel cell with stainless steel mirrors. For this same sequence of cells, the performance will generally be greatest for the stainless steel cell over the nickel-aluminum cell over the glass cell.

Why is that true? Once again it is the achievable quality of the mirrors. The grinding, polishing, and gold coating of a stainless steel mirror offers higher quality control than that of nickel-aluminum mirrors and that of glass mirrors; that higher quality costs more to achieve, so stainless steel cells with stainless steel mirrors will be priced higher than the other cell-body/mirror combinations. Roughly speaking, an all-stainless steel will be priced at two times the price of a Ni-Al cell and three times the price of an all-glass cell.

The point of this short essay on long path gas cells of the White cell configuration is that all cells are different and persons seeking a cell for gas analysis applications should first match the scientific quality required for their specific application with the performance quality of the type of gas cell, as described above, and then rely on word-of-mouth for the selection of a gas cell supplier.

For additional information on long path gas cells, please feel free to contact CIC Photonics, Inc. via email at request@cicp.com or by telephone at 505-343-9500.