

PRISM CAVITY RING DOWN SPECTROSCOPY

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Although Cavity Ring Down Spectroscopy (CRDS) is a well proven tool for trace gas detection because of its high sensitivity and fast response, it has some clear disadvantages. Since it is based on high performance mirrors, which are only highly reflective over narrow spectral regions, measurements of multiple species in different spectral regions cannot be performed without changing the mirrors. This involves exposing the cell to ambient air and realignment of the optics. In addition, it is not yet possible to get highly reflective coatings for all spectral regions and the coatings may be damaged by extremely corrosive gases during measurements.

We recently introduced a prism cavity ring down method that can overcome these limitations. The cavity consists of two prisms - one having a curved surface - forming a stable ring resonator. A small portion of p -polarized laser light is coupled into the cavity by setting the angle of the incident beam near Brewster's angle. Working at exactly Brewster's angle with the second prism, we only get a very small, controlled loss for p -polarized light in the cavity. The optical beam undergoes two total internal reflections in each prism at 45° ; therefore the spectral range is limited only by the absorption and the dispersion of the prism material itself. With this technology a single ring down cavity can be used over a wide spectral range, from the near UV to the mid-IR without any changes in optics or alignment. Thus providing a more versatile useable spectrometer, which combines high sensitivity and fast response of conventional CRDS with a very good broadband reflectivity.

