ULTRAVIOLET INTRACAVITY LASER ABSORPTION SPECTROSCOPY

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Intracavity Laser Absorption Spectroscopy (ICAS) provides an excellent solution for ultrasensitive, multiplexed, quantitative detection of reactive species, but has traditionally been limited to the visible and infrared spectral regions by the requirement for direct broadband lasing media. We report the first realization of this technique in the ultraviolet (UV-ICAS), based on a home-built Ce:LiCAF laser that operates in the 280-316 nm range. Three key species were investigated using our prototype UV-ICAS spectrometer: formaldehyde, sulfur dioxide, and hydroxyl radical. Successful initial measurements of static gases (the formaldehyde $\tilde{A}\,^1A_2 - \tilde{X}\,^1A_1$ electronic transition and the sulfur dioxide $\tilde{X}\,^1B_2 - \tilde{B}\,^1A_1$ electronic transition) led us to record in situ the $A\,^2\Sigma^+ - X\,^2\Pi$ spectrum of hydroxyl radical in a butane flame. Comparison of the latter to a LIFBASE simulation allowed single shot extraction of the temperature of hydroxyl radicals in the flame, demonstrating the data acquisition efficiency of UV-ICAS. We will also discuss the technique's potential for novel ultrasensitive, high resolution, broadband spectroscopy.