DEVELOPMENT OF HIGH RESOLUTION INFRARED CAVITY RINGDOWN SPECTROMETER: PROSPECTIVE APPLICATIONS FOR ORGANIC PEROXY RADICALS.

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Our recent [a,b] progress on detection and characterization of organic peroxy radicals via near infrared $\tilde{A}^2\mathrm{A}' - \tilde{X}^2\mathrm{A}''$ transition has proven the great utility of CRDS for the detection of reactive intermediates. However the ambient temperature in our experiments is a key factor limiting the quality and information content of the observed spectra. Therefore we are developing a high resolution near IR CRDS apparatus capable of operation with a jet-cooled sample.

A high resolution pulse-amplified ring cw dye Ti/Sapphire laser system has been extensively used in our lab in various experiments[c]. This system presently yields light with a bandwidth of 100-150MHz and coupled with stimulated Raman shifting in a multipass Herriot type cell can be utilized as an efficient source of narrow band IR radiation in the 7000-8000 cm^{-1} region. This apparatus was tested on extraordinary weak $\mathrm{a}^1\Delta_g - \mathrm{X}^3\Sigma_g^-$ transition of oxygen under ambient cell and slit supersonic jet expansion conditions. The data clearly show that the apparatus has sufficient resolution and sensitivity to record rotationally resolved spectra of various chemical intermediates, including peroxy radicals, under jet-cooled conditions.

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[b] M. B. Pushkarsky, S. J. Zalyubovsky and T. A. Miller, J. Chem. Phys. **112**, 10695(2000)

[c] Xue Quing Tan, James M. Williamson, Stephen C. Foster and T. A. Miller, J. Phys. Chem. **97**, 9311(1993)