HIGH RESOLUTION, NEAR AND MID IR, JET-COOLED, CAVITY RING-DOWN SPECTROSCOPY WITH A NOVEL DISCHARGE EXPANSION

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The frequency coverage of our CRDS spectrometer[a] has been extended from the 1.0 – 1.5 μm region to the 3 – 3.5 μm region, which opens exciting opportunities for studying the C-H fundamental vibrational modes of molecules and free radicals. Furthermore, higher resolution has been provided by using difference frequency generation (DFG) based on a Fourier transform limited Ti:Sapphire pulse-amplified laser[b]. As an example, the jet-cooled spectra of the CH_3 radical with partially resolved hyperfine structures will be presented. Non-exponential effects in the ring-down decay have also been minimized by using the narrow bandwidth radiation.
Additionally, a novel transverse discharge arrangement had been designed to improve stability, and also to provide a capability of mixing chemical reagents downstream. We will present preliminary spectral results and kinetic analyses characterizing this radical source.

[a] Shenghai Wu, Patrick Dupré and Terry A Miller, *Phys. Chem. Chem. Phys.*, 2006 (Accepted, DOI: 10.1039/b518279d)
[b] Patrick Dupré and Terry A Miller, *The 60th Symposium on Molecular Spectroscopy*, 2005, TJ10