High-resolution mid-infrared time-resolved dual-comb spectroscopy

P.-L. Luo [1]*
[1] plluo@gate.sinica.edu.tw, Institute of Atomic and Molecular Sciences Academia Sinica, Taipei 106319, Taiwan.

Dual-comb spectroscopy, a Fourier transform spectroscopic technique based on two frequency combs at slightly different repetition rates, enables broadband molecular fingerprinting with both high-resolution and high spectral sampling rate. Here, a new approach to high-resolution time-resolved spectroscopy by utilizing mid-infrared dual-comb spectrometers will be reported. The mid-infrared dual-comb sources are constructed based on electro-optic frequency comb and the difference frequency generation techniques. The time-resolved infrared absorption spectra can be measured with Doppler-limited resolution at microsecond time resolution to determine the pressure broadening coefficient of the simplest Criegee intermediate (CH_2OO).[1] Moreover, the yields and formation mechanisms of OH and HO_2 radicals formed from the reactions involving the simplest Criegee intermediate are also investigated via direct determination of the CH_2OO, CH_2O, OH, and HO_2 with synchronized two-color time resolved dual-comb spectroscopy.[2]

References:
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2. Luo, P.-L.; Chen, I.-Y. Synchronized two-color time-resolved dual-comb spectroscopy for quantitative detection of HO_x radicals formed from Criegee intermediates. *Anal. Chem.* **94**, *94*, 5752–5759 (2022).