ABSOLUTE LINE STRENGTH MEASUREMENTS OF THE OH ν_1 FUNDAMENTAL TRANSITIONS WITH SYNCHRONIZED TWO-COLOR TIME-RESOLVED DUAL-COMB SPECTROSCOPY

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The hydroxyl radical (OH) is one of the most important species in physical chemistry, atmospheric science, and astrophysics. In both field observations and laboratory studies, quantitative determination of the OH radical is essential to decipher the complex oxidation chain reactions as well as to evaluate the oxygen abundance in the stars. Herein, we report direct measurements of line strengths of the OH ν_1 transitions via simultaneous determination of H_2O_2 and OH in the 248-nm photolysis of H_2O_2 reaction system using synchronized two-color time-resolved dual-comb spectroscopy.[a] High-resolution spectra of H_2O_2 and OH were simultaneously measured at a time resolution of tens of μs for studying the photodepletion of H_2O_2, the formation of OH radicals, the reaction between OH and H_2O_2, and then further to determine the absolute line strength of the OH ν_1 transitions. By fully analyzing the high-resolution time-resolved dual-comb spectra, accurate measurements of the line strength of ten OH transitions near 3378, 3408, 3422, 3465, and 3484 cm^{-1} were achieved with a small uncertainty of less than 10%.[b]

[a] P.-L. Luo and I-Y. Chen, Anal. Chem. 94, 5752 (2022).

[b] C.-W. Chang, I-Y. Chen, C. Fittschen, and P.-L. Luo, J. Chem. Phys. 159, 184203 (2023).