

Ro-vibrational excitation of CO₂ in transient ns-discharges by laser absorption spectroscopy

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CO₂ dissociation stimulated by vibrational excitation in non-equilibrium discharges has drawn lots of attention. We will demonstrate the first nanosecond resolved measurement of the ro-vibrational excitation of CO₂ in a repetitively pulsed ns discharge by laser absorption spectroscopy. The high resolution of 8 ns is achieved by a slow temperature scan of a quantum cascade laser and a segmented data capturing scheme. The time evolution of rotational temperature and vibrational temperatures for different modes are simultaneously determined for the discharge phase and the subsequent afterglow. A preferential excitation in the asymmetric stretching mode is experimentally observed in the discharge phase shortly after the breakdown. Valuable insights into the CO₂ excitation/relaxation dynamics resulting from these measurements will also be discussed.