KINETICS OF VIBRATIONAL UP-PUMPING STUDIED BY STEP-SCAN FOURIER TRANSFORM SPECTROSCOPY

E. PLÖNJES [a], P. PALM [a], I. ADAMOVICH, J.W. RICH, *Department of Mechanical Engineering, The Ohio State University, Columbus, OH 43210*; W. URBAN, *Institut für Angewandte Physik der Universität Bonn, 53115 Bonn, Germany*.

Gaseous CO in an Ar diluent is prepared in vibrational state $v = 1$ by absorption of pulsed CO laser radiation. Energy subsequently diffuses into higher vibrational states (to $v = 40$) by vibration-to-vibration exchange pumping. This diffusion of energy through vibrational quantum states is observed by step-scan FTIR emission spectroscopy on the 1^{st} overtone CO bands. The method permits monitoring of the time evolution of the vibrational state populations during the exchange pumping process. $\Delta v = 2$ emission spectra at 1 cm^{-1} resolution and 50 μsec time intervals are obtained. Vibrational state-resolved energy exchange rates are inferred from these measurements. In addition, state-resolved associative ionization rates for collisions of vibrationally excited CO are inferred.

[a] Visiting Scholar at The Ohio State University, permanently at the Institut für Angewandte Physik der Universität Bonn, 53115 Bonn, Germany