PULSED 2-DIMENSIONAL RAMAN SPECTROSCOPY ON DROPLETS H. Moritz, R. Vehring, G. Schweiger*, Ruhr-Uni Bochum, Maschinenbau, Laseranwendungstechnik u. Messsysteme, D-44780 Bochum, Germany; e-mail: moritz@lat2.lat.ruhr-uni-bochum.de

For a detailed experimental investigation of mass transfer in aerosols or sprays, it is essential to determine the concentration of the individual chemical components in the vapor and the liquid phase. Vehring et al. (1995) have shown that the chemical composition in the liquid and gas phase can be determined simultaneously by linear 2-D Raman spectroscopy using a cw Ar+-laser. However no measurements could be made closer than ~100 micrometer to the surface of the droplet and between the droplets.

These limitations can be overcome by using a pulsed Raman technique as shown in this paper. The experimental setup was similar as in the work of Vehring et al. However, an image intensifier was mounted in front of the CCD camera. The camera was mounted on the exit plane of the monochromator and used to record the Raman spectra. The intensifier was gated synchronously with the droplet generator. The length of the gate pulse, typically 100 ns, was adjusted for appropriate space resolution. By this technique the droplets could be frozen virtually in space. The delay time between the gate pulse and the trigger pulse from the droplet generator could be varyied. This made it possible to shift the area analyzed by the monochromator relatively to the droplet position and the gas composition between the droplets could be determined.

The technique was tested on the system acetylene dissolved in acetone, Moritz et al. (1996). With this solution a chain of droplets with a very narrow size distribution was generated. The droplet size was typically 50 micrometer and the distance between the droplets was 120 micrometer. The vapor concentration and the liquid concentrations in the droplets were recorded close to and between the droplets.

Vehring R., Moritz H., Niekamp D., Schweiger G., and Heinrich P., Appl. Spectrosc. 49, 1215-1224 (1995).
Moritz H., Vehring R., and Schweiger G., J. Aerosol Sci. 27, S517-518 (1996).