RAMANSCATTERING ON LIQUID AEROSOL PARTICLES: CONCENTRATION MEASUREMENTS ON DROPLET CHAINS. R. Vehring and G. Schweiger, Fachgebiet Thermodynamik, Fachbereich Maschinenbau, Universität Duisburg Gesamthochschule, W–4100 Duisburg, Germany.

A new technique is described which allows the investigation of the water vapor cloud in the neighbourhood of evaporating water microdroplets. The method was applied to investigate the evaporation process on a chain of freely moving droplets in the size range of ~ 30 μm. Simultaneously the absolute concentration of liquid water in the droplet chain could be determined. Chains of microdroplets were generated by a vibrating orifice generator and passed through the focal region of an argon ion laser. The spontaneous Raman spectrum of the 90^0 scattered light was recorded by a liquid nitrogen cooled CCD camera mounted on the exit slit of a double monochromator.

The Raman signals from water vapor and from liquid water could be separated. The way in which the intensity of the Raman signal from the microdroplets varies with their size was determined. With that, the absolute concentration of the liquid water could be derived from a comparison of the Raman signal from the particles with calibration data.

The optics which collected the stray light were set up in such a way that the direction of the dispersion of the monochromator and the direction of droplet chain propagation were parallel to one axis of the chip of the CCD–camera. Therefore, from the intensity distribution along the second axis of the chip the concentration of the water vapor can be derived as a function of the distance from the axis of the droplet chain. A resolution of 2,5 μm can be achieved.

With this technique a detailed analysis of the mass transport in evaporating droplet chains can be performed. It is possible to extend the method to the investigation of sprays, if suitable triggering can be implemented. It also shows great potential to the measurement of multicomponent evaporation.