

12:05 pm Tuesday 15 February

A 19 PROBING SURFACE PROPERTIES AND SURFACE REACTIONS ON MICRON-SIZED PARTICLES

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The technique of optical levitation is used to stably trap a single liquid microparticle with a typical diameter of 10 μm by light pressure in a vertical beam of laserlight. The particle is trapped inside a chamber under controlled pressure, temperature and gas composition.

Processes on the particle surface such as evaporation or condensation, the forming of a surface layer, chemical reactions or shape changes are investigated by the analysis of elastically and inelastically scattered light.

By comparing calculated and measured intensities from elastically scattered light, changes in particle size are determined very precisely, especially by evaluation of the size dependence of the so called morphology dependant resonances (MDR) in the elastically scattered light.

The chemical composition and changes in this composition are observed by Raman scattering. The strong dependence on MDR are used to investigate chemical and structural changes on the surface of a microparticle with high sensitivity.

It is demonstrated that the combination of the technique of optical levitation with light scattering methods (Rayleigh scattering, Raman scattering) makes the determination of surfaces processes and surface properties on microparticles possible, which contain chemical substances of only a few nanograms.