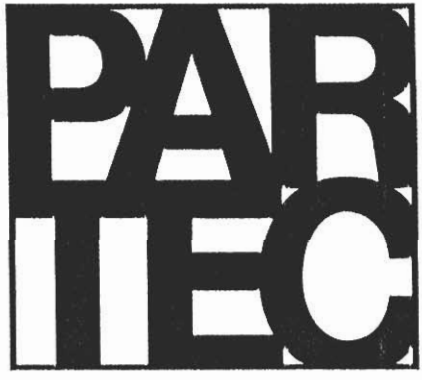
PARTEC 98

7th European Symposium Particle Chararcterization

4th European Symposium Separation of Particles from Gases

1st European Symposium Process Technology
in Pharmaceutical and Nutritional Sciences

Abstracts



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NÜRNBERG MESSE

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Chemical characterization of single levitated microparticles

Apparatus and techniques are presented which allow trapping and subsequent physical and chemical analysis of charged aerosol particles by Raman-spectroscopy.

Solid and liquid particles with a diameter larger than 1 µm were captured from flowing aerosol with an electrodynamic balance (EDB). Two different methods were used to charge the particles. Carbonaceous particles were charged by photoemission which was induced by UV radiation from an excimer lamp. All other particles were charged by a corona charger. After charging, the particles were captured and levitated by the quadrupole field of an EDB, which had a bihyperboloidal electrode configuration. The vertical position of the particle in the balance was monitored with a photodiode array and controlled with an additional dc-field.

An argon-ion laser was used to excite Raman-scattering from the particles. The 90° scattering was recorded with a spectrograph and a cryogenically cooled CCD-camera.

Different test particles made of Na_2SO_4, TiO_2, DES and soot were identified. For the first time, an in situ molecular analysis of tropospheric aerosol particles was performed. The detection limit was found to be of the order of 0.1 pg. The crystalline state of salt particles with a mass larger than 10 pg was determined.

The potential of the method for quantitative analysis is assessed theoretically and experimentally.