Particle growth has been a subject to many different investigations. Besides industrial interests also the fundamental processes are being studied. It has been found, that particle growth can be divided into three stages: nucleation, coagulation and accretion [1].

Experiments on the behavior of particle growth have been carried out in both, rf and dc driven discharges. In addition to etching materials lying on surfaces special gases such as methane and acetylene can be used to initialize particle growth. In earlier experiments particles with diameters of up to several µm were observed. The composition and surface structure changes with the materials used to trigger growth.

The plasma is run inside a u-shaped glass cylinder (so-called PlasmaKristall-4, [2]). At both ends a hollow electrode is attached allowing a homogeneous gas flow. A mixture of argon and 2.2% acetylene at pressures up to 150 Pa was employed. The gas is introduced with flow rates ranging from 1 to 10 sccm. One electrode is powered by positive currents up to 3 mA corresponding to a maximum of 3 kV. The other electrode stays grounded at all times. Several tests changing the polarity and the position of the powered electrode revealed that particle growth could only be triggered if the gas is fed through the positive electrode.

During the experiments described here not only the particles but also transport phenomena and plasma changes in their vicinity in a dc discharge were investigated. The particles appear close to the positive electrode and are transported along the tube as soon as they reach a critical size by the gas flow. A dependence of the size on the applied gas flow and thereby on the neutral gas drag has been observed. Depending on the flow the transport behavior changes from steady state to a periodicity with frequencies in the order of several Hz. In the vicinity of the particles the plasma emission intensity increases. Hence the electron temperature differs in the presence of the particles. In addition plasma instabilities (striations) travelling along with the particles were observed. [3]