The field of nanoparticle preparation is nowadays rapidly evolving. Most of the approaches can be classified as wet chemistry techniques. On the other hand, gas aggregation sources offer an alternative, purely physical approach of how to fabricate nanoparticles in a controlled and reproducible manner.

Many kinds of nanoparticles were already produced in this way, e.g. metallic, metal oxides or plasma polymer nanoparticles. Moreover, as it was demonstrated in recent studies, even heterogeneous nanoparticles by combining more types of materials may be produced by such sources. Among them, an increasing interest is devoted to the metal/plasma polymer nanoparticles.

Concerning the production of metal/plasma polymers nanoparticles, the majority of so far published studies focused on the nanoparticles with metallic cores surrounded by a plasma polymer overcoat. Because of this, we decided to investigate a novel two-step deposition procedure for the production of metal/plasma polymer nanoparticles with inverse structure, i.e. nanoparticles with plasma polymer cores covered by metal. This method is based on the gas aggregation technique for plasma polymer nanoparticle fabrication (C:H:N:O in this study) followed by subsequent in-flight coating by sputtered metal (silver, copper and titanium). The production process was monitored in terms of deposition rate, magnetron voltage, optical emission and laser light scattering. Ex situ characterization of produced nanoparticles was done by SEM, TEM, XPS and UV-Vis.

For most of the experiments reported in this thesis, silver was used for coating of plasma polymer nanoparticles. It was shown that nanoparticles with plasma polymer cores decorated with silver satellites were obtained in this case. The silver satellites stemmed from the island growth of Ag on the plasma polymer core particle that was serving as a substrate. Moreover, it was found that the size and number of silver satellites presented on C:H:N:O cores may be controlled by the amount of sputtered silver.

However, preliminary experiments that were performed with copper and titanium revealed that the mechanism of satellite formation might not be generally applicable for other metals.