Nanoparticles (NPs) are used for an increasing amount of a variety of products and applications e.g. inorganic dyes (paints in the automotive industry), which are characterized by their temperature and UV resistance. Here, physical properties, such as e.g. the color (light absorption) depend on the NP-size and are very different from non nanostructured material (Quantum effect, for example in gold NP) [1]. In everyday products NPs are found in creams as UV protection application e.g. titanium dioxide and zinc oxide NPs with diameters of approximately 30-80 nm. An increasing amount of fabrics contain Ag NPs because of their antibacterial effects. These effects are caused by silver ions on the particle surface and therefore increased with increasing surface area. However, toxic effects on animals have been reported and harmful effects on human health are possible. Ag NPs are also environmentally accumulated. PbSe NPs belong to the semiconductor-NPs. Besides the use in the electronics industry, semiconductor-NPs are used in the manufacture of solar cells [1, 2]. Here, the NPs serve as a precursor for nanolayers which ensures the production of thin Solar cells. It is also possible to stack nanosheets what is used in e.g fuel cell application [1]. PbSe NPs are also suitable thermoelectrica [2]. Thermoelectrica are materials that convert thermal energy in electrical energy and vice versa. [1] Furthermore, PbSe NPs are used as laser materials, optical filters and sensors [3].

Analysis of NPs for once is important to optimize and evaluate the synthesis of NPs. Second it is important to monitor the mobilization of NPs in the environment; here most harmful effects can be expected from air borne NPs, because they penetrate deep into the lungs. In both cases the amount of sample is minute.

Total X-ray reflection analysis (TXRF) is a time and cost efficient analysis capable to nondestructively analyze minute amounts of sample material. Specimen preparation in environmental TXRF usually includes preparation of a liquid sample on a carrier, which is then dried to give a small residue. Small deposits of aerosols can be analyzed likewise, if the Si-wafer with the aerosol is placed in an adapted sample holder.

Direct analysis of NPs fresh from synthesis was evaluated using TXRF and graphite furnace atomic absorption spectrometry (GF-AAS), which is like TXRF capable of analyzing minute sample amounts. Collection efficiency of an airborne particle collection device capable collecting particles down to 15 nm in diameter in 10 size fractions (low pressure Berner impactor LPBI) was evaluated for NPs having different shapes.

Then, aerosols from fabrics coated with Ag NPs were collected from a test control unit with the LPBI. TXRF measurements are usually carried out in air, so an Ar Kα peak at 2.957 keV that is interfering with the Ag L-lines around 2.984 keV will always occur and therefore be hampering the analysis of minute amounts.

In order to eliminate the Ar signal, we build a box for our TXRF instrument (Picofox, Bruker) that can be connected to a nitrogen gas container and opposing to that to a vacuum pump. The pump is required to apply a nitrogen flow for cooling. With the argon peak eliminated, determination of the Ag NPs was possible. For comparison single particles were also analyzed using electron micro probe analysis.