Mercury and Arsenic compounds were often used to prevent damage of cultural heritage specimens e.g. herbaria and paintings. \( \text{HgCl}_2 \) was mostly used for the preservation. Over time, \( \text{Hg}_0 \) is formed by bacterial activity and released into the air. Mercury in the gas phase is very toxic for humans. Accordingly, access to archives may need to be controlled because of the hazard originating from high \( \text{Hg} \) and \( \text{As} \) gas phase concentrations. Our aim is to develop a reliable and accurate analysis of airborne \( \text{Hg} \) using a small footprint and efficient micro-analytical tool already available in many laboratories. We decided on a procedure to enrich the airborne mercury on silver nanoparticles (AgNPs) and determine its concentration by using TXRF (Total-X-ray-fluorescence spectroscopy). We optimized the synthesis of our AgNP preparation method. We studied the efficiency and reproducibility of the \( \text{Hg} \)-capture of washed and non-washed AgNP-specimens. We found that per batch, the standard deviation of Ag in average was about 10%. Washed carriers had about 60% less Ag than non-washed specimens. Interestingly, \( \text{Hg} \) capture of the washed carriers was significantly higher than of the ones that were just dried. Quantification in environmental TXRF is in general achieved by using an internal standard. Initially, we used a Ga standard solution. We found that a low pH during the drying process results in the formation of large Ag crystals (Fig. 1). Accordingly, we tested alternatives having basic to neutral pH i.e. Cr and Mo STD solutions. The TXRF results showed a good reproducibility using Mo however a low reproducibility for Cr. Micro-XRF studies on the spatial correlation confirmed a good Ag to Mo correlation however poor Ag to Cr correlation, explaining the TXRF results.

![fig. 1: Ag-NPs under light-microscope (left: Ag-NPs normal (10 µL); right: Ag-NPs (9 µL) + \( \text{HNO}_3 \) 3% (1 µL)](image)