

Contribution to accurate Spherical Gold Nanoparticles analysis (size, size distribution) by SpICPMS and SAXS

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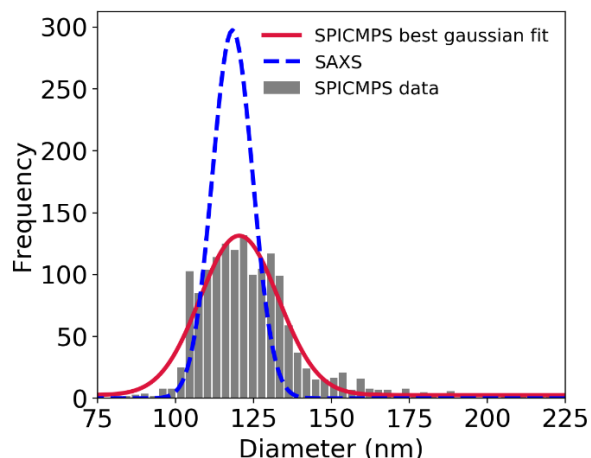
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Small-Angles X-Ray Scattering (SAXS) has been established as a metrological method for the determination of nanoparticles size and size distribution. Modern SAXS Laboratory experiments¹, by involving synchrotron-based instrumentation at lower price and very stable X-ray source, are more and more used in nanomaterials domain. In the frame of the EMPIR Innanopart project, we have developed a methodology for the size, size distribution and concentration determination of spherical nanoparticles. This protocol involves a precise sample preparation, and a set of homemade software tools for the data processing - from the acquisition, the absolute scaling, to the analysis.

spICPMS is not a metrological traceable technique but has many strengths to become a useful complement of nanoparticle characterization methods such as SAXS and microscopy. It can also measure highly diluted nanoparticles suspensions which is not the case of Dynamic Light scattering (DLS) or SAXS. Finally, ICPMS analyzes inorganic ions in liquid solution in a very large range of concentration, which should allow linear diameter measurement range over at least 3 orders of magnitude.

In this work, we confront spICPMS with SAXS in order to investigate the method and the developed protocols on a set of commercial spherical Gold Nanoparticles.



Comparison between SAXS and spICPMS method for the determination of size of spherical Gold Nanoparticles

¹ Olivier Taché et al., « MOMAC: a SAXS/WAXS laboratory instrument dedicated to nanomaterials », *Journal of Applied Crystallography* 49, n° 5 (1 octobre 2016): 1624- 31, <https://doi.org/10.1107/S1600576716012127>.