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Olivier Taché, V A Geersten, Antoine Thill

► To cite this version:

Olivier Taché, V A Geersten, Antoine Thill. Accurate protocol for nanoparticles analysis (size, size distribution, concentration) by SAXS and spICPMS. Nanoparticle concentration – critical needs and state-of-the-art measurement, Apr 2018, London, United Kingdom. 10.1107/S1600576716012127 . cea-02339570

HAL Id: cea-02339570

<https://hal-cea.archives-ouvertes.fr/cea-02339570>

Submitted on 30 Oct 2019

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Accurate protocol for nanoparticles analysis (size, size distribution, concentration) by SAXS and spICPMS

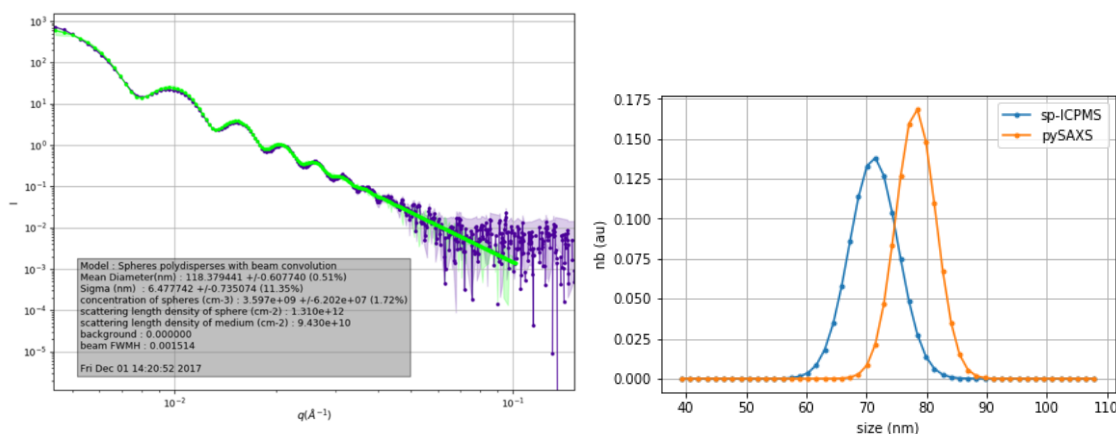
O. Taché, Dr. V. Geersten, Dr. A. Thill

NIMBE (Nanoscience & Innovation Laboratory) / Fundamental Research Division / CEA Paris-Saclay
RD306 – 91191 Gif sur Yvette Cedex FRANCE

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 use in nanomaterials domain. In the frame of the Innanopart project we have develop a methodology for the size and concentration determination of spheric Silica 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 by spICPMS.

In this work, we confront spICPMS, as a counting technique, with SAXS in order to investigate the method and the developed protocols on a set of commercial 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>.