



VAMAS

Surface Chemical Analysis Technical Work Area 2

Project A44 Quantitative Imaging Using NanoSIMS for Biological Materials

Objective

The aim of this international interlaboratory comparison is to validate a protocol for quantifying concentrations of drugs and metabolites using Nanoscale Secondary Ion Mass Spectrometry (NanoSIMS).

The work forms the first steps towards a documentary standardised protocol for NanoSIMS and relates to ISO TC 201 (Surface Chemical Analysis).

Background

NanoSIMS has found great utility in providing high spatial resolution (< 50 nm), but only semi-quantitative, mapping of drugs and metabolites at a subcellular scale. However, it is necessary to develop a robust method to carry out quantitative measurements to expand the usability of the data.

The team at AstraZeneca have developed a protocol to prepare test materials that have been used to generate calibration curves for bromine and iodine. These curves allowed the researchers to successfully provide absolute quantification of halogen-containing analytes in fixed and resin-embedded biological samples at a high spatial resolution. The interlaboratory study

will help to validate the protocol, develop best practices and provide confidence in NanoSIMS measurements.

Standardization Needs

The pre-standardisation need addressed here is the interlaboratory comparison of results obtained when a protocol for quantification of analyte in a biological context is used.

There are currently no standardised procedures for quantitative imaging of biological materials using NanoSIMS.

Relevant Standards Committees

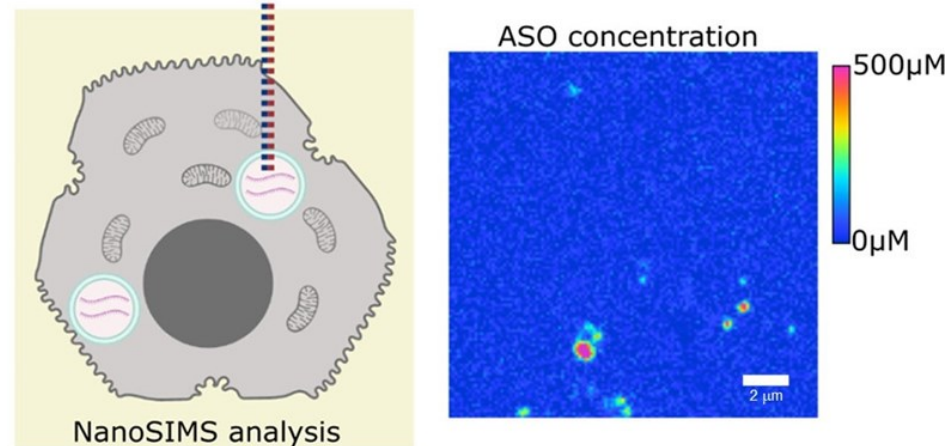
ISO/TC 201 Surface Chemical Analysis

Work Programme

- Protocol for NanoSIMS measurement will be prepared.
- Samples will be prepared by project leadership and distributed to participants along with protocol.
- The results of the analysis will be compared with uncertainty evaluations.
- The project started in August 2024 for a duration of 24 months.

Call for Participation

Cs⁺ → Secondary ions



NanoSIMS schematic and Hue Saturation Intensity image showing concentration of Antisense Oligonucleotide within a primary human hepatocyte (Becquart et al, Anal. Chem, 2022)

Deliverables and Dissemination

- Publication in a peer-reviewed scientific journal and presentations in conferences.
- A draft international report of a protocol of direct quantification of analytes in biological samples using NanoSIMS to be submitted to ISO TC 201.

Volunteers Welcome

Participants will fund their own involvement (approx. 4 days work).

For more information:

Prof. Takuo Yasunaga
Project Lead,
Kyushu Institute of Technology, Japan
yasunaga@phys.kyutech.ac.jp

Prof. Ian Gilmore
Chair, VAMAS TWA 2
National Physical Laboratory (NPL) U.K.
ian.gilmore@npl.co.uk

www.vamas.org

August 2024