

Study of sample preparation for biological applications ICP MS

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New approaches of sample introduction to inductively-coupled plasma mass spectrometry (ICP MS) are presented - substrate-assisted laser (SALD ICP MS) and diode laser thermal vaporization (DLTV ICP MS). These methods are suitable for quantitative elemental analysis of low volume samples (typically 100 – 500 nL) with minimal or no sample pretreatment and represent an alternative to nebulizers.

SALD ICP MS is suitable for off-line coupling with capillary electrophoresis for speciation analysis and biological samples, such as metalloproteins or metal complexes can be analyzed also in the different detection modes, such as matrix-assisted laser desorption/ionization mass spectrometry (MALDI MS) after addition of matrix to the sample. Complementary SALD ICP MS and MALDI MS techniques provide information on both metal content and protein mass or identity from the same sample. Applicability of SALD ICP MS was demonstrated on study of copper metabolism in disulfiram-treated myeloid leukemia U937 cells and determination of copper in Blue exploding protein of *Neocapritermes taracu*.

In contrast to laser ablation or SALD ICP MS, the DLTV does not require an expensive high-energy pulse laser; the technique employs a low-cost NIR diode laser. The diode laser induces pyrolysis and/or burning of the substrate and the generated aerosol is carried out into the plasma torch. The technique was applied to determine lead in whole blood and tin in canned food.

Detailed characterization of both methods and their applications will be discussed.