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Multicollector ICPMS and TIMS as tools for isotopic fingerprinting

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Elements such as C, N, O and S are essential for chemical and biological processes in nature and very small shifts in the isotopic composition of these elements are important tracers to explore complex processes in nature. During the last few years, stable isotopes of elements as Cl, Ca, Fe, Cu, Zn, Sr, Hg and Pb are getting more and more attention as tracer to study biomedical and environmental processes, as well as forensics and archaeometry. Multi-collector ICPMS and TIMS enable high-precision isotopic analysis of these so-called non-traditional stable isotope systems.

MC-ICPMS is a powerful technique for the isotopic analysis of most elements, with the exception of light elements such as H, C, N and O and the noble gases. Various inlet systems can be used to introduce samples into the mass spectrometer, for instance gas chromatography (GC), liquid chromatography (LC)) for compound-specific isotope analysis, laser ablation for direct analysis of solids, or conventional liquid nebulization for liquid samples. The aerosol is transported by an Ar and/or He gas flow into the ICP source where it is effectively ionized and introduced into the mass analyzer through a differential pumping system. Molecular interferences as carbides, nitrides, oxides, argides or doubly-charged species can show up in the mass spectrum and interfere with the elemental isotope peaks. High mass resolution is needed to effectively discriminate against these interferences. The NEPTUNE *Plus* is specially designed to meet this requirement and expand the power of isotope ratio measurements even to elements where previously isobaric interferences were the limit.

For some specific isotope systems, such as Ca, Sr and Pb, the thermal ionization technique may have advantages, due to the potentially lower backgrounds and higher sensitivity. Prior to the TIMS analysis, the sample is chemically purified, loaded on a filament and introduced into the mass spectrometer. With the introduction of the TRITON *Plus*, instrumental progress of TIMS has been made, e.g. with an optimized configuration for the simultaneous analysis of all calcium isotopes.

In this poster we will describe a selection of applications on isotopic fingerprinting using non-traditional stable isotope systems measured on the TRITON *Plus* and NEPTUNE *Plus.*