Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.18342

Performances of isotopic ratio measurements of Sr and U by MC-ICPMS using oxygen in collision/reaction cell

HÉLÈNE ISNARD[1], YVAN GÉRARD[2] AND DANIEL PETERS[2]

[1]DES - Service de Physico-chimie (SPC), CEA, Université Paris-Saclay
[2]Nu Instruments Ltd

Presenting Author: helene.isnard@cea.fr

Mass spectrometry techniques, involving multicollector systems, have the capability to measure low concentration isotope ratios in a very precise and accurate way. In most cases, the measurements must be associated with previous chemical treatment to prevent matrix effects and isobaric interferences. The use of separation techniques, such as chromatography, has major drawbacks in nuclear applications as it increases the handling time on radioactive samples and the radioactive waste produced.

The Collision/Reaction Cell based multicollector ICP-MS (MC-ICP-MS) allow for avoiding such drawbacks and several applications have been developed on a first generation of MC-ICP-MS equipped with Collision/Reaction Cell (Isoprobe, GV Instrument) for in situ direct separation of several radionuclides present in nuclear samples [1]. The recent acquisition in the Laboratory of Analytical development for Nuclear Isotopic and Elemental analysis (CEA, LANIE) of a Sapphire MC-ICP-MS instrument (Nu Instruments) allows for the development of new analytical methods for nuclear applications or environmental studies.

We will present different applications on the Sapphire instrument using O_2 as reactive gas in the Collision/Reaction Cell. O_2 is used to supress the isobaric interference between Sr and Zr in nuclear samples [2] and is very useful for the determination of minor isotope ratios of uranium by measuring uranium in mass shift mode [3]. We have conducted isotopic ratio measurements of Sr and U on low energy mode using O_2 in the collision reaction cell and compared with the reproducibilities obtained on Sr and U isotope ratios in high energy mode. The results obtained in the two modes are compared and future applications on real samples were discussed.

[1] Diez-Fernandez S. et al. (2020) *Journal of Analytical Atomic Spectrometry* **35**, 2793-2819.

[2] Isnard H. et al (2006) *Spectrochimica Acta Part B* **61**, 150-156.

[3] Diez-Fernandez S. et al. (2020) *Talanta* 120221.