Contribution ID: **1086** Type: **Verbal**

Application of fluoride target materials in AMS measurement of uranium isotopes

Thursday, 19 May 2022 09:40 (20 minutes)

Accelerator mass spectrometry (AMS) is arguably the most sensitive method for determination of isotopic ratios for a variety of trace nuclides in many different fields of interest, including uranium-236 and since recently also uranium-233. Both these radionuclides, being almost solely anthropogenic, occur in the environment at extremely low concentrations, usually reaching well below 10^(-10) for uranium-236 and even lower for uranium-233. Related analyses of these isotopes serve not only as a reliable fingerprint of nuclear contamination for safeguards monitoring purposes but also allow for distinguishing between sources of emission, including different types of fission reactors and global fallout [1]. Besides, an ever-growing demand for uranium-236 determination persists in marine sciences, where it can be used as a highly conservative tracer. Due to low concentrations, a high overall sample-to-detector efficiency is required, which depends strongly on initial chemical separation yield as well as subsequent chemical form used for negative ion production during measurement. To improve the ionization efficiency, a sample preparation method based on lanthanide fluoride co-precipitation and mixing with lead fluoride has been developed [2] and further modified. Applicability of uranium-fluoride target materials has been evaluated by series of ionization efficiency and isotopic ratios measurement realised in collaboration with Laboratory of Ion Beams Physics, ETH Zurich and VERA AMS Laboratory, University of Vienna.

[1] Hain, K., Steier, P., Froehlich, M.B. et al. 233U/236U signature allows to distinguish environmental emissions of civil nuclear industry from weapons fallout. Nat Commun 11, 1275 (2020)
[2] Prášek, T., Němec, M., Steier, P., et al., New fluoride target matrix preparation procedure for determination of 236U with accelerator mass spectrometry. Nucl Instrum Methods Phys Res B 472, 64-71 (2020)

Acknowledgement:
This research is financially supported by RAMSES project, CZ.02.1.01/0.0/0.0/16_019/0000728, EU Operational programme Research, Development and Education

Primary authors: PRÁŠEK, Tomáš (CTU, FNSPE); NĚMEC, Mojmír (CTU FNSPE)

Co-authors: CHRISTL, Marcus (ETH Zurich); GAUTSCHI, Philip (ETH Zurich); VOCKENHUBER, Christof (ETH Zurich); KERN, Michael (University of Vienna); STEIER, Peter (University of Vienna)

Presenter: PRÁŠEK, Tomáš (CTU, FNSPE)

Session Classification: Nuclear Analytical Methods

Track Classification: Nuclear Analytical Methods