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Ionization scheme development for actinides at the LARISSA laboratory in Mainz

Thursday 28 March 2024 13:30 (30 minutes)

In order to perform ultra trace analysis of radionuclides in environmental samples based on resonance ionization mass spectroscopy (RIMS), efficient and highly element-selective laser excitation schemes are required. To analyse different all-relevant actinides within a single sample during one measurement, simple and versatile two-step ionization schemes need to be developed. The use of fully automated grating Ti:sapphire lasers featuring intra-cavity second harmonic generation allows for an easy and instantaneous change of the ionization scheme and therefore element of interest during the measurement.

In the past few years, the RIMS method has been successfully used at the RISIKO mass separator in the Institute of Physics Johannes Gutenberg University Mainz for the development of highly efficient and selective ionization schemes and spectroscopic studies on various actinides. This presentation will focus on the development of ionization schemes and on atomic and nuclear studies of the minor actinides that are present in spent nuclear fuel, which comprises neptunium, americium, and curium. New two-step excitation schemes for the analysis of $^{237,239}\text{Np}$, $^{241,243}\text{Am}$ and $^{244-248}\text{Cm}$ were identified and investigated and will be discussed.

Workshop Themes

RIS, scheme development, atomic spectroscopy

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