

High-sensitivity sector-field HR-ICP-MS: boosting the Thermo Scientific Element XR performance for radiogenic isotope measurements in dry plasma

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Sector field, single collector inductively coupled mass spectrometry is a powerful and versatile established technique which is used for a wide range of trace elemental and isotope ratio applications in wet and dry plasma. Mass and signal stability, scanning speed, low backgrounds and sensitivity are key parameters which determine the final quality of the measurement.

The optional Jet Interface of the Thermo Scientific Element XR (consisting in specially designed Jet sample cone, X skimmer cone and a high-capacity interface pump) can boost the sensitivity in dry plasma mode up to several tens of times compared to introducing the sample via the standard interface in wet plasma. The resulting benefit for isotope ratio measurements is improved precision which e.g. for laser ablation U/Pb dating applications leads to lower uncertainty of the final U/Pb dates (hence improved age resolution) or allows for higher spatial resolution.

In this contribution we focus on Pb, U and Pu isotope analyses in dry plasma mode following desolvation of liquid samples, for which maximum sensitivity as well as the high-resolution capability and extended dynamic range of the Element XR mass spectrometer are key. Analytical protocols and instrument parameters are presented based on both examples from the literature and a novel approach recently developed for the measurement of isotope ratios where the lowest abundance sensitivity is required.