Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.23193

# Further Development of Aligned LA-ICP-MS

**NICHOLAS R WEST** AND DR. C. ASHLEY NORRIS

Norris Scientific

Presenting Author: nw@norsci.com

Isotopic mapping by LA–ICP–MS has shown considerable utility in the earth sciences [1]. When performing mapping with a single-collector scanning mass spectrometer, aliasing or “spectral skew” can occur under certain experimental conditions [2], or appear gradually over a long mapping session due to timing drift. By actively aligning the precise timing of each laser shot with the mass scan of the spectrometer, aliasing can be eliminated, to ensure that the plume of ablated aerosol from each laser shot reaches the detector at exactly the same moment of every mass scan (or “sweep”) [3]. Active alignment allows the laser and mass spectrometer to be operated using a wider variety of instrument settings, in particular with fast washout cells which can achieve improvements in sensitivity, resolution, or overall speed of acquiring an image.

Our alignment device [3] uses a very high impedance voltage divider to directly measure the DC component of the quadrupole voltage. This reveals the position of the mass filter in real time, to enable synchronisation of the exact timing of the laser to align with each sweep of the quadrupole. Our device has previously been demonstrated with quadrupole mass spectrometers from Thermo Scientific and Agilent (including MS–MS instruments).

In this presentation we describe the sensor circuit of the device and explore the adaptation of this sensor to measure the acceleration voltage of a magnetic sector instrument (Thermo Element XR), which allows this kind of mass spectrometer to also be used for aligned LA–ICP–MS. We also describe further progress towards making the device compatible with Nexion quadrupole spectrometers from Perkin Elmer.

We also introduce the “sweep log” feature of the device, which records the duration of every sweep scanned by the mass spectrometer. This log allows sweep–perfect alignment between ablation intervals defined in the laser log file(s) and the ICP–MS data file(s), even during long-duration experiments.

References

[1] Chew, David, et al. *Chemical Geology* 559 (2021): 119917.

[2] Van Malderen, Stijn JM, et al. *Spectrochimica Acta* Part B: Atomic Spectroscopy 140 (2018): 29-34.

[3] Norris, C. Ashley, et al. *Journal of Analytical Atomic Spectrometry* 36.4 (2021): 733-739.