Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.28249

High Precision Noble Gas Measurements using the Isotopx SIRIX Mass Spectrometer

DAMIAN TOOTELL[1], DAVID ROUSELL[2] AND ZENON A PALACZ[2]

[1]Isotopx
[2]Isotopx Limited

Measuring noble gas isotope ratios using sector field mass spectrometry is a well-established technique and is used in many geochemistry applications. Traditionally, these isotope systems are measured using a 'static-vacuum' approach, whereby the sample is admitted to a mass spectrometer after the all the mechanical pumps have been isolated. This is due to the samples, typically trapped in small rock minerals, having extremely low concentrations of noble gases.

However, certain samples contain larger reservoirs of noble gases such as those trapped in ice-core air bubbles or volcanic gases. As a result, it's been proven possible to make measurements of these noble gases on dynamic mass spectrometers [1,2], those which constantly pump the instrument as the sample is injected into the mass spectrometer source. Isotopx produce such a mass spectrometer called the SIRIX. This has primarily been designed for applications investigating clumped isotopes, but can easily be adapted to analyse noble gas isotopes.

We would like to showcase the SIRIX performance when analysing noble gases, utilising the excellent abundance sensitivity and source sensitivity of the instrument. When this performance is allied with the revolutionary ATONA® Faraday detector amplifier technology [3], we can demonstrate a significant leap in analytical precision.

[1] J.P. Severinghaus et al (2003) *Geochemica et Cosmochimica Acta* 67 325-343

[2] A.M. Seltzer et al (2022) *Int. J. Mass Spectrom.* 478, 116873

[3] S.E. Cox et al. (2020) *Geochronology*, 2, 231–243