Please ensure that your abstract fits into one column on one page and complies with the *Instructions to Authors* available from the Abstract Submission web page.

Doubling sensitivity in MC-ICP-MS using high-efficiency, rapid-response laser ablation technology.

***G. CRAIG*[1*], *A. J. MANAGH*[2], *C. STREMTAN*[3], *N. S. LLOYD*[1] *AND M. S. A. HORSTWOOD*[4]**

[1]Thermo Fisher Scientific (Bremen) GmbH, Germany
[2]Loughborough University, Loughborough, UK
[3]Teledyne CETAC Technologies
[4]NERC Isotope Geosciences Laboratory, British Geological Survey, UK
(*correspondence: grant.craig@thermofisher.com)

Laser ablation multicollector inductively coupled mass spectrometry (LA-MC-ICP-MS) is one of the most sensitive mass spectrometry techniques. Detection efficiencies (number of ions detected/number of atoms sampled) of 2 % for Pb and 2.8 % for U [1] have been reported for the Thermo Scientific™ NEPTUNE *Plus* MC-ICP-MS and are comparable to those typically reported for solution introduction using a desolvating nebulizer system.

Recent developments have seen the introduction of rapid-response laser ablation cells and sample transport technologies, enabling signal pulse durations for a single laser ablation shot of less than 10 ms [2]. This has resulted in marked improvements in analytical throughput, resolution and sensitivity [3,4] vital for the generation of large, highly spatially-resolved elemental maps. The focus on mapping, particularly bioimaging, in their development has until now [5] mostly obscured the possibility of using the sensitivity advantage of rapid-response technologies for other LA-ICP-MS applications.

Here we report the coupling of the NEPTUNE Plus to a Teledyne CETAC™ Analyte G2 equipped with just such a rapid-response sample transport system, the Aerosol Rapid Introduction System (ARIS™), to achieve higher detection efficiencies than previously reported for LA-MC-ICP-MS. Compared to a conventional two-volume configuration we achieved a twofold increase in sensitivity across the entire mass range (Li – U). The increase in sensitivity was utilised to improve a number of example applications – Pb isotope ratio analysis, small spot (20 µm) Hf analysis of zircons and Rb/Sr in carbonates.

[1] Schaltegger (2015) *Chem. Geo.,* **402**, 89-110 [2] van Malderen (2016) *J. Anal. At. Spectrom.,* **31**, 423-439. [3] Douglas (2015) *Anal. Chem.*, **87**, 11285–11294. [4] van Malderen (2018) *Spectrochim. Acta - Part B At. Spectrosc.,* **140**, 29-34. [5] Petrus (2017) *Chem. Geo.*, **463**, 76-93.