In situ laser ablation split-stream (LASS-) MC-ICP-MS/ICP-MS for simultaneous determination of Re-Os isotopes and siderophile-chalcophile elements in sulfides: Ablating away a Cornelian dilemma

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Since the late 90s, both elemental (eg. PGEs) and isotopic in situ characterisations of (mantle) sulfides have demonstrated to be powerful tools to unveil and date magmatic processes. Unfortunately often, due to analytical and sample limitations (mantle sulfides Ø<100μm), investigators were left with the dilemma of choosing between trace elements or Re-Os isotopes. Owing to the considerable increase in sensitivity of the newer generations of Nu Instruments MC-ICP-MS [table 1], we were able to perform the first *in situ* LASS-MC-ICP-MS/ICP-MS acquisition of trace elements and Re-Os isotopes from a single ablation. Analytical setting is composed of a Photon-Machines 193nm excimer laser coupled to an Agilent 7700x ICP-MS and a Nu-Plasma II MC-ICP-MS. After ablation in a He atmosphere, the analyte is carried to the spectrometers via 1/8" tubing. The analyte was split using a Y connector. Re-Os measurements were obtained using a mixed array of faraday cups + ion counters [1]. Due to the ion counter limitation, the amount of analyte sent to the Nu Plasma was restricted, thus allowing to divert the excess towards the ICP-MS for PGE and chalcophile-elements abundances. This means, that the implementation of the LASS was done without any sensitivity (thus precision) loss for the MC-ICP-MS.

Instrument	NP I	NP II	NP I	NP II
Mode	Solution		Laser Ablation 65 µm	
Configuration	Faradays Only		Faradays + ICs	
Split-stream	*Not applicable*		NO	YES
Ref. Material	JM-Os 25 ppb		PGE-A	
Total Os	~8 V	>15 V	~0.10 V	~0.15 V

While count statistics on the ICP-MS were significantly lower (≈50%), accuracy and reproducibility for trace elements in reference materials (e.g., Po62, Ai3-W, FeS1) are satisfactory. For instance. [Os] in Po62 was ca. 1.67±0.06 ppm, while [Ir], [Pd] and [Se] were found to be 9.38±0.32, 9.65±0.55, 168±1 ppm, respectively, for AI3-W.

[1] Pearson *et al*., (2002) **G.C.A.** 66: 1037-1050.