

LA-ICPMS operating conditions and data acquisition parameters

Laser ablation system	New Wave Research NWR213 solid state Nd:YAG laser with aperture imaging
Laser wavelength	213 nm (Nd:YAG)
Laser mode	Q-switched (Nd:YAG)
Nominal pulse width	4 ns (Nd:YAG)
Repetition rate	5 Hz
Spot sizes (diameter)	20 μm
Incident pulse energy	~ 0.05 mJ per pulse (at 25 μm beam size, 40%)
Energy density on sample	9.3-9.6 J/cm ² (homogenized energy distribution)
Ablation cell	standard TV2 cell with custom sample holder
Ablation cell gas flow rates	850 ml/min He
Tubing for gas flow	Tygon S3 B44-3 and S-50 HL
Laser beam focus	Fixed at sample surface

ICP-MS	Thermo-Fisher Scientific ELEMENT 2 double-focusing magnetic sector-field ICP-MS
Interface cones	Ni sampler and skimmer cone
Detector type	single-collector discrete dynode electron multiplier
Detector mode	cross-calibrated pulse counting and analogue
Detector vacuum	10 ⁻⁷ mbar (during analysis)
Mass resolution	300 (low resolution)
Scan type	E-scan
Detection mode	Both
Integration type	Average
Acquisition mode	Time resolved analysis
Argon gas flow rates (l/min):	
Plasma	16
Auxiliary	0.80
Sample	0.975
RF power	1375 W
Lenses (V):	
Extraction	-1999
Focus	-1075
X-Deflection	4.80
Y-Deflection	-2.35
Shape	110
SEM potential	2700 V

Data acquisition parameters for U-Th-Pb dating	
Isotopes measured (sampling time in brackets) for U-Th-Pb	²⁰² Hg (10), Mass 204 (²⁰⁴ Hg + ²⁰⁴ Pb) (20), ²⁰⁶ Pb (10), ²⁰⁷ Pb (50), ²⁰⁸ Pb (10), ²³² Th (10), ²³⁸ U (20)
Settling times	1 ms (magnet fixed on Hg ²⁰²)
Search & integration window	4 %
Samples per peak	100
Oxide production rate	Tuned to $\leq 0.1\%$ UO ₂ (²⁵⁴ UO ₂ / ²³⁸ U)
Analysis duration	30 s. blank, 30 s. ablation, 30 s. washout.
Processing software	lomite vers. 2.5 (Hellstrom et al. 2008) including VizualAge DRS (Petrus & Kamber, 2012)
External standardization	GJ-1 zircon (Jackson et al. 2004) with Harvard 91500 (Wiedenbeck et al. 1995, 2004) and Plesovice zircon (Slama et al. 2008) for data control
Internal standard isotope	²³⁸ U