

Table S3 Instrumental parameters of LA-SF-ICP-MS for zircon Ti measurement

Ti content of **zircon samples** was determined by laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) employing an Element XR HR-ICP-MS instrument (Thermo Fisher Scientific, USA) coupled to a 193nm ArF excimer laser system (Geolas HD, Lambda Physik, Göttingen, Germany) at the State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences. The approach is similar to that outlined in **Wu et al. (2018)** with isotopes measured using a peak-hopping mode with a laser diameter of ca. **32 μm** and **5 Hz** repetition rate. The laser energy density is **~4.0 J/cm² (Wu et al., 2018)**. The Element XR is equipped with the so-called “jet-interface”, comprising of a jet sample cone, an H-version skimmer cone and a high capacity vacuum pump (OnTool Booster 150, Asslar, Germany). This leads to a signal enhancement in laser sampling mode by a factor of 3-5, resulting in an improved detection capability. Helium was employed as the ablation gas to improve the transporting efficiency of ablated aerosols. NIST SRM 610 and ARM-1 reference glass was used for external calibration (**Jochum et al., 2011; Wu et al., 2019; Wu et al., 2021**). **Silicon (²⁹Si)** was used as an internal standard. The resulting data were reduced based on the **Iolite 3.4 software**. For Ti (>0.005 μg/g), the accuracy is better than ±10 % with analytical precision (1 RSD) of ±10%.

Laser system	
Make, Model & type	GeoLas HD 193 nm ArF
Laser wave length	193 nm
Pulse width	20ns
Energy density/fluence	3J cm ⁻²
Repetition rat	5Hz
Spot size	32μm
Sampling mode/patten	Single point ablation
Ablation gas flow (He)	0.75L min ⁻¹
Ablation duration	35s
ICPMS	
Make, Model & type	Thermo Element XR
RF Power	1320W
Guard electrode (Pt)	Connected
Sample cone	nickel standard cone, Jet sample cone
Skimmer cone	nickel “H” skimmer cone
Coolant gas flow (Ar)	15.00L min ⁻¹
Auxiliary gas flow (Ar)	0.80L min ⁻¹
Carrier gas flow (Ar)	0.95L min ⁻¹
Scan mode	E-scan
Isotopes measured (m/z) ⁺ sample time (ms)	⁷ Li(6), ²⁷ Al(11), ²⁹ Si(11), ³¹ P(20), ⁴⁹ Ti(50), ⁵⁷ Fe(6), ⁸⁹ Y(11), ⁹³ Nb(6), ¹⁰⁰ Mo(6), ⁹⁵ Mo(6), ⁹⁸ Mo(6), ¹¹⁸ Sn(6), ¹³⁹ La(6), ¹⁴⁰ Ce(6), ¹⁴¹ Pr(6), ¹⁴⁶ Nd(6), ¹⁴⁷ Sm(6), ¹⁵³ Eu(6), ¹⁵⁸ Gd(6), ¹⁵⁹ Tb(6), ¹⁶³ Dy(6), ¹⁶⁵ Ho(6), ¹⁶⁶ Er(6), ¹⁶⁹ Tm(6), ¹⁷² Yb(6), ¹⁷³ Yb(6), ¹⁷⁵ Lu(6), ¹⁷⁸ Hf(11), ¹⁸¹ Ta(6), ¹⁸² W(6), ²³² Th(6), ²³⁸ U(11)
Mass window	20%
Sample per peak	20

Detection system	Single SEM detector in triple mode, Counting, Analog and Faraday
Resolution (M/ Δ M)	~300
□ Total integration time per reading	1.625s

reference

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