

锆石LA-ICP-MS原位微区U-Pb定年及微量元素的同时测定

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中文摘要:利用配有New Wave 213 nm激光和ThermoFisher X Series 2四极杆等离子体质谱,对年龄在158~1065 Ma之间的5个标准锆石进行了U-Pb同位素和微量元素的同时测定。测定结果显示,在激光频率为10 Hz,斑束直径为30 μm下,91500、GJ-1、TEMORA-1、Plešovice和Qinghu标准锆石所获得的加权平均年龄分别为(1059±11) Ma (2σ, n=21), (604.4±4.7) Ma (2σ, n=25), (419.3±3.4) Ma (2σ, n=14), (338.7±2.4) Ma (2σ, n=23)和(158.9±1.7) Ma (2σ, n=18) respectively when the laser frequency was 10 Hz and laser ablation spot size was 30 μm. The relative errors (2σ) of a single point of age were all smaller than 5.6%, and the relative deviation (2σ) of weighted average age were all smaller than 1.08%. The results agree with the ID-TIMS and SHRIMP data reported previously. Using NIST 610 as the reference material and ²⁹Si as the internal calibrate, the authors analyzed twenty trace and rare earth elements for these reference zircons under the same test condition. All the other trace elements and the trace elements results of 91500 fall within the range of the reported literature except Nb in Plešovice which is higher than the reported value. Pb, Th and U of GJ-1 all fall in the region of reported TIMS data, while Th and U of TEMORA-1 fall within the range of reported SHRIMP data, and Th and U of Qinghu fall within the range of reported SIMS data. Chondrite-normalized REE distribution curves of these standard zircons show that the relative content of rare earth elements obtained is accurate.

中文关键词:LA-ICP-MS 锆石 U-Pb定年 微量元素

In Situ U-Pb Dating and Trace Element Simultaneity Determination of Zircon by LA-ICP-MS

Abstract: Various reference zircons 158 - 1060 Ma in age and trace elements were analyzed simultaneously using New Wave 213 nm laser ablation inductively coupled plasma-mass spectrometry (LA-ICP-MS). The results showed that the weighted average ages of 91500, GJ-1, TEMORA-1, Plešovice and Qinghu standard zircons were (1059±11) Ma (2σ, n=21), (604.4±4.7) Ma (2σ, n=25), (419.3±3.4) Ma (2σ, n=14), (338.7±2.4) Ma (2σ, n=23) and (158.9±1.7) Ma (2σ, n=18) respectively when the laser frequency was 10 Hz and laser ablation spot size was 30 μm. The relative errors (2σ) of a single point of age were all smaller than 5.6%, and the relative deviation (2σ) of weighted average age were all smaller than 1.08%. The results agree with the ID-TIMS and SHRIMP data reported previously. Using NIST 610 as the reference material and ²⁹Si as the internal calibrate, the authors analyzed twenty trace and rare earth elements for these reference zircons under the same test condition. All the other trace elements and the trace elements results of 91500 fall within the range of the reported literature except Nb in Plešovice which is higher than the reported value. Pb, Th and U of GJ-1 all fall in the region of reported TIMS data, while Th and U of TEMORA-1 fall within the range of reported SHRIMP data, and Th and U of Qinghu fall within the range of reported SIMS data. Chondrite-normalized REE distribution curves of these standard zircons show that the relative content of rare earth elements obtained is accurate.


keywords: LA-ICP-MS zircon U-Pb age trace element

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