LKZ-1: A new zircon standard for U-Pb dating, O-Hf isotopic and trace element analysis

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Chemical and isotopic analyses of minerals essentially require the use of reliable reference materials. Here, we introduce a new zircon standard, namely LKZ-1, for the analysis of U-Pb age, O-Hf isotopes, and trace elements. This gem-quality zircon single crystal from Sri-Lanka yielded a slightly discordant isotope dilution-thermal ionization mass spectrometric U-Pb age ($^{207}Pb/^{206}Pb$ age = 575.22 ± 0.98 Ma). The sensitive high-resolution ion microprobe analysis yielded a comparable $^{206}Pb/^{238}U$ age of 572.6±2.0 Ma, with moderately high U concentrations (619±21 ppm, 1 standard deviation), restricted Th/U ratios (0.146±0.002), and negligible common Pb contents (^{206}Pbc < 0.2%). Secondary ion mass spectrometric and laser ablation-assisted multiple collector ICPMS analyses showed little variation in O ($\delta^{18}O_{V\text{-}SMOW}$ = 10.65±0.14 ‰; laser fluorination value = 10.72±0.02 ‰) and Hf ($^{176}Hf/^{177}Hf$ = 0.281794±0.000016) isotopic compositions. LKZ-1 was also quite homogeneous in chemical composition (RSD of laser ablation ICPMS data ≤ 10%, for most >1 ppm elements), displaying a relatively uniform chondrite-normalized rare earth element pattern ($(Lu/Gd)_N$ = 31±3, Eu/Eu^* = 0.43±0.17, Ce/Ce^* = 44±32). These consistencies suggest that the LKZ-1 zircon is a suitable working standard for geochronological and geochemical analyses.