Electronic Supplementary Material (ESI) for Journal of Analytical Atomic Spectrometry.

Figure S1 Thin-section of the Panzhihua gabbros. The pits on cpx are laser ablation positions for Sm-Nd isotope analyses. The red scale bars are 500 μm. Pl, plagioclase; cpx, clinopyroxene.

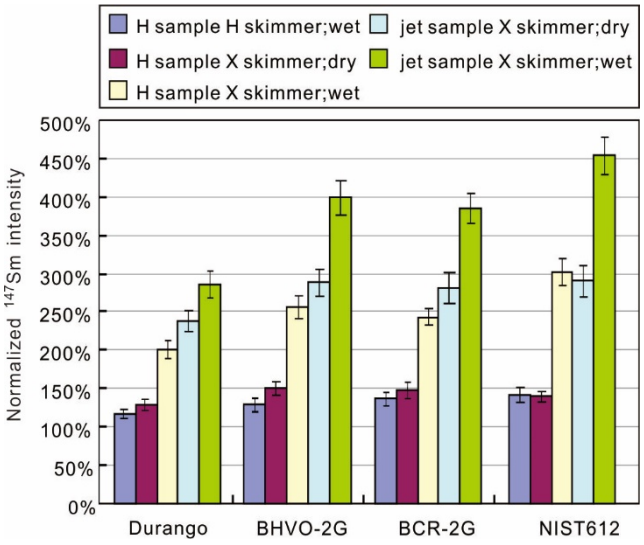

Figure S2 Comparison of signal intensities of ^{147}Sm using three different interface cone assemblages with or with the addition of water vapor. All ^{147}Sm signal intensities are normalized to that obtained using H sample cone and H skimmer cone assemblage without the addition of water vapor. BHVO-2G, BCR-2G and NIST SRM 612 were measured using a 155 μm laser spot with 15 Hz repetition rate, whereas the apatite Durango was measured using 60 μm laser spot with 7 Hz repetition rate. All the test analyses were conducted with laser raster ablation. The uncertainty bars (2 standard deviations) were calculated from three replicated analyses. Wet means with the addition

of water vapour and dry means without the addition of water vapor.

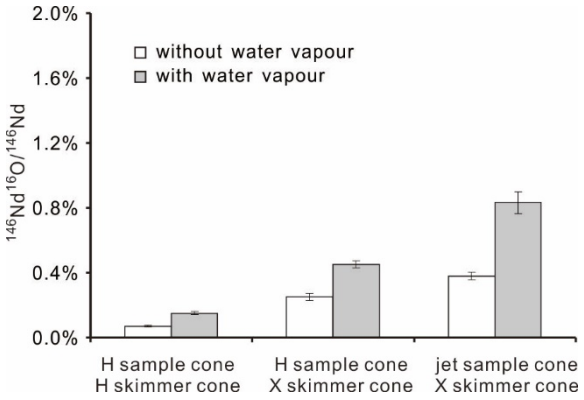

Figure S3 Oxide yields of Nd obtained with or without water vapor addition. All the test analyses were conducted with laser raster ablation on a high-purify Nd metal nugget (spot size: 17 μm; repetition rate: 3 Hz; moving speed: 2 μm s^{-1}). The uncertainty bars (2 standard deviations) were calculated from three replicated analyses.

Analytical methods

LA-ICP-MS analysis for trace elements of clinopyroxene megacryst (LJM-1)

Trace elements in LJM-1 were measured with an ELEMENT XR (Thermo Fisher Scientific) ICP -MS coupled with a 193-nm (ArF) RESOlution M-50 (Resonetics) laser ablation system in the State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences. Laser condition was set as following: beam size, 33 μm; repetition rate, 5Hz; energy density, ~4 J cm^{-2}. A smoothing device (The Squid, Laurin Technic) was used to smooth the sample signal. Each spot analysis consisted of 30 s gas blank collection with the laser off, and 30 s sample signal detection with the laser on. Signals of the following masses were detected: ^{29}Si, ^{45}Sc, ^{51}V, ^{59}Co, ^{88}Sr, ^{89}Y, ^{90}Zr, ^{93}Nb, ^{139}La, ^{140}Ce, ^{141}Pr, ^{146}Nd, ^{147}Sm, ^{151}Eu, ^{157}Gd, ^{159}Tb, ^{162}Dy, ^{165}Ho, ^{166}Er, ^{169}Tm, ^{174}Yb, ^{175}Lu, ^{178}Hf, ^{181}Ta, ^{208}Pb, ^{232}Th and ^{238}U. Si, pre-measured with EPMA, was selected as the internal standard element. The calibration line for each element was constructed by analyzing three USGS reference glasses BCR-2G, BHVO-2G and GSD-1G. The oxide molecular yield, indicated by the $^{232}Th^{16}O/^{232}Th$ ratio, was less than 0.4%. The detailed experiment procedure and data

reduction strategy are described in Zhang et al. (2019). An USGS reference glass TB-1G was measured as unknown samples. 15 analyses of TB-1G indicate most elements are within ±8% of the reference values and the analytical precision (2RSD) was better than 10% for most elements.

ID-TIMS analysis for 147Sm/144Nd and 143Nd/144Nd of clinopyroxene megacryst (LJM-1)

The determinations of 147Sm/144Nd and 143Nd/144Nd of LJM-1 were conducted on a Triton TIMS (Thermo Fisher Scientific) located in the Laboratory for Radiogenic Isotope Geochemistry at the University of Science and Technology of China. Three sets of fine powder of LJM-1 were weighed and were spiked by a mixture of 149Sm and 146Nd for isotope dilution measurements. Sm-Nd fractions were separated from major cations using AG50W×8 resin. P507 resin was used to separate Sm from Nd. Total procedural blanks were <50 pg for Nd and Sm. The measurement of Nd reference material JNdi-1 yielded 143Nd/144Nd = 0.512111 ± 0.00006 (2SD, n = 3), agreeing well with its preferred value (0.512115 ± 0.00007, Tanaka et al., 2000).

Reference

Tanaka T, Togashi S, Kamioka H, et al. JNdi-1: a neodymium isotopic reference in consistency with LaJolla neodymium[J]. Chemical Geology, 2000, 168(3-4): 279-281.

Zhang L, Ren Z Y, Xia X P, et al. In situ determination of trace elements in melt inclusions using laser ablation inductively coupled plasma sector field mass spectrometry[J]. Rapid Communications in Mass Spectrometry, 2019, 33(4): 361-370.