minerals

MDPI

Supporting Information to:

Simultaneous Quantification of Forsterite Content and Minor–Trace Elements in Olivine by LA–ICP–MS and Geological applications in Emeishan large igneous province

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EPMA

The olivines in the Dali, Pingchuan, and Lijiang picrites were analyzed using a JEOL 8230 instrument at the East China University of Technology, Nanchang, China. The operating conditions were a 20 kV accelerating voltage, 300 nA beam current, and 3 μm electron beam. ZAF corrections were used to convert k-ratios to concentrations. The peak counting times were 40 s for Fe and 20 s for Mg and Si. The background counting times were half those of the peak times. Analytical spots in olivine were at least ca. 30 μm from the mineral edges, in order to avoid any effect from secondary fluorescence on the target signal intensities. The RMs used for quantification were rhodonite for SiO_2, almandine garnet for FeO, and olivine for MgO. The precision and accuracy during the analytical sessions were monitored by replicate analyses of olivine RM MongOLSh11-2, which was analyzed as an unknown 2 times after every batch of 20 measurements. The mean SiO_2, FeO, and MgO contents and calculated Fo values for MongOLSh11-2 were 40.68 ± 0.37 *wt.*%, 10.11 ± 0.07 *wt.*%, 48.83 ± 0.26 *wt.*%, and 89.60 ± 0.07 (2 sd; N = 64), respectively. These values are consistent with the recommended values. In this study, the EPMA technique was used to validate the Fo values obtained by LA–ICP–MS.

Table S1. Reference values for GOR132-G. MgO and FeO (t) are given with a unit of *wt.*% and all others are given by μg g^{-1}. "*" represents the information values.

	Mass fraction	Uncertainty (2)
MgO	22.4	0.2
FeO (t)	10.1	0.1
Li	8.9	1.2
Na	6157	297
Al	58216	1058
P*	216	72
Ca	50659	719
Sc	36.5	1.2
Ti	1835	78
V	214	17
Cr	2528	183
Mn	1193	50
Co	92.7	5.7

Ni	1187	58
Cu	205	21
Zn	76.8	12.5
Ga	10.4	0.9
Y	12.9	0.5

The data were taken from the GeoReM database (http://georem.mpch-mainz.gwdg.de/) [1, 2]

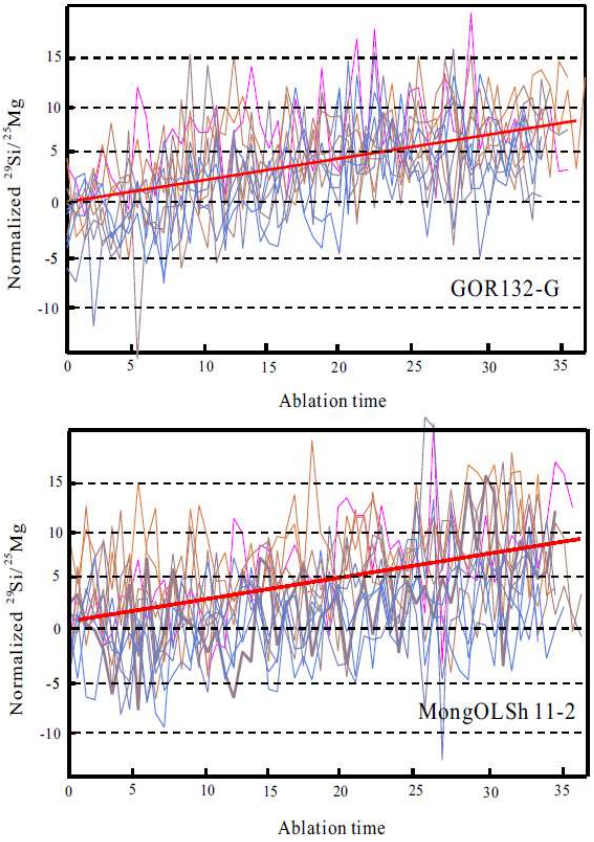

Figure S1. Comparison of down-hole fractionation (DHF) of Si/Mg in GOR132-G glass and MongOL Sh11-2 olivine. Laser spot size is 44 μm. In order to compare at the same scale, the $^{29}Si/^{25}Mg$ ratios are normalized to the mean value of initial two seconds.

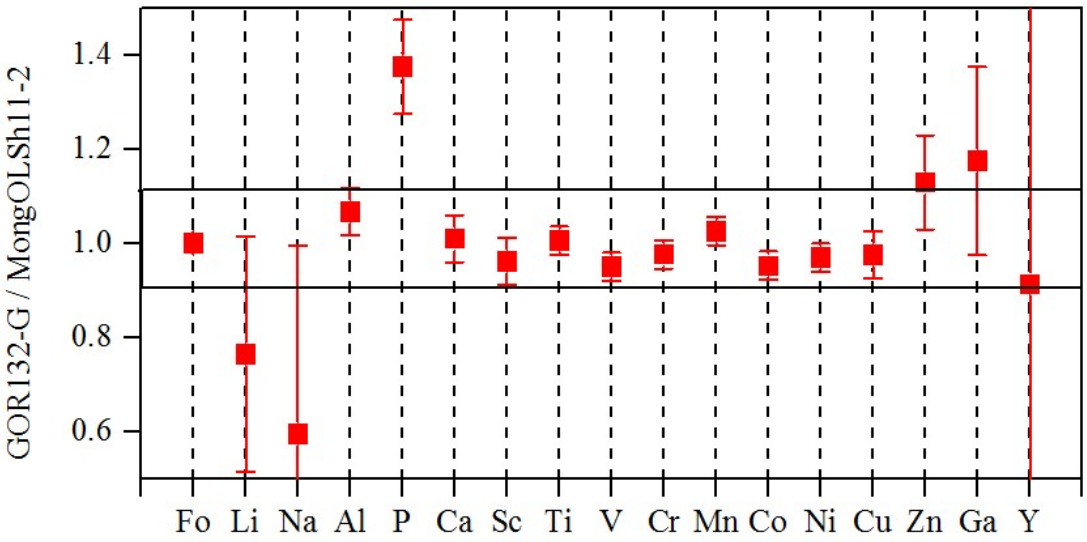

Figure S2. Results of Fo contents and minor-trace element in one Lijiang olivine quantified using GOR132-G and MongOLSh11-2 as calibration standards. The results show the data calibrated by GOR132-G match with the data by MongOLSh11-2 within 10%, except Li, Na, P, Zn, and Ga.

Reference:

1. Jochum, K. P.; Nohl, U.; Herwig, K.; Lammel, E.; Stoll, B.; Hofmann, A. W. *Geostand. Geoanal. Res.*, **2005**, *29*, 333.
2. Jochum, K. P.; Nohl, U. *Chem. Geol.*, **2008**, *253*, 50.