Table S1 Major element and Cr isotopic compositions of the synthetic Cr-979S standard determined by EPMA, ICP-MS and SEMS.

	Value	Uncertainty	n	method	Reference
SiO_2	66.0%	1.15%	108	EPMA	Our study[a]
TiO_2	2.89%	4.67%	108	EPMA	Our study[a]
Al_2O_3	13.76%	2.02%	108	EPMA	Our study[a]
MgO	5.42%	2.83%	108	EPMA	Our study[a]
CaO	7.20%	2.88%	108	EPMA	Our study[a]
Na_2O	2.51%	6.74%	108	EPMA	Our study[a]
Cr_2O_3	1.32%	20.5%	108	EPMA	Our study[a]
Cr	11461 μg g^{-1}	6.77%	3	ICP-MS	Our study[b]
$^{50}Cr/^{52}Cr$	0.051859	±0.000100		SEMS[c]	Shields *et al.* (1966)[58]
$^{53}Cr/^{52}Cr$	0.113386	±0.000145		SEMS[c]	Shields *et al.* (1966)[58]
$^{54}Cr/^{52}Cr$	0.028222	±0.000059		SEMS[c]	Shields *et al.* (1966)[58]

[a]Major element compositions of the synthetic Cr-979S standard were conducted on a JEOL JXA-8100 electron microprobe (EPMA) with a beam size of 10 μm, an accelerating voltage of 15 kV and a beam current of 20 nA at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS).

[b] The concentration of Cr was determined by solution ICP-MS (7500a, Agilent) at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS).

[c]SEMS is the abbreviation for surface emission mass spectrometry.

Figure S1 Fe isotopic compositions measured by fs LA-MC-ICPMS in two grains of BCR-2G glasses mounted in different positions of the two-volume ablation cell (5000 cm^3 with a super-high-sensitivity sample cup of 1.6 cm^3). $\delta^{56}Fe_{BCR\text{-}2G}$ presents that $\delta^{56}Fe$ values of sample BCR-2G are reported relative to BCR-2G as reference standard. The red triangles represent average values in each group. The red line represents the theoretical value of $\delta^{56}Fe_{BCR\text{-}2G} = 0$. Error bars are 2SE for individual measurements and 2SD for average values.

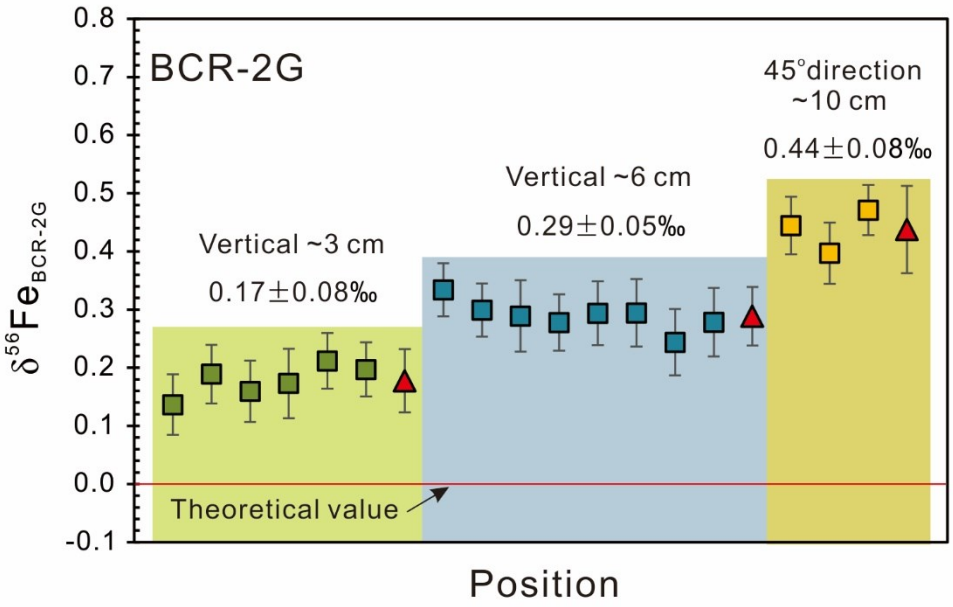

Figure S2 The homogeneity of Cr isotopic compositions of Cr-979S standard measured by fs LA-MC-ICPMS along a horizontal profile with a length of 8 millimeters. $\delta^{53}Cr_{Cr\text{-}979S}$ presents that $\delta^{53}Cr$ values of the Cr-979S standard are reported relative to the Cr-979S standard as reference standard. The red triangle represents the average $\delta^{53}Cr_{Cr\text{-}979S}$ value of the Cr-979S standard. The red line represents the theoretical value of $\delta^{53}Cr_{Cr\text{-}979S} = 0$. Error bars are based on 2SE for individual measurements and 2SD for average value.