

Supplementary Table 1 Chemical compositions and phase proportions of the coexisting phases.

#104	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO ^a	MnO	MgO	CaO	Na ₂ O	K ₂ O	La ₂ O ₃ ^x	S	Total
Fe-poor Mg-Pv (39) ^b	57.35	0.31	2.37	0.11	1.62	0.16	38.47	0.04	0.03	0.02	0.14	0.02	100.65
N=13 ^c	0.48	0.08	0.19	0.08	0.22	0.10	0.72	0.05	0.04	0.02	0.11	0.03	
Fe-rich Mg-Pv (18)	55.12	0.21	3.51	0.76	4.89	0.73	34.40	0.33	0.10	0.00	0.00	0.01	100.06
N=9	0.77	0.09	0.74	0.24	0.71	0.17	1.15	0.14	0.07	0.00	0.00	0.02	
Melt (1)	54.16	0.07	3.57	0.19	4.62	0.67	22.23	5.35	4.49	3.59	1.03	0.01	100.00
N=2	0.02	0.05	0.07	0.01	0.03	0.20	0.04	0.06	0.02	0.30	0.29	0.01	
Stishovite (9)	96.86	0.02	0.32	0.01	0.31	0.03	0.14	0.01	0.03	0.04	0.03	0.06	97.86
N=5	2.02	0.02	0.15	0.02	0.22	0.04	0.06	0.02	0.03	0.03	0.06	0.07	
K-Hollandite (1)	65.57	0.00	15.59	1.81	0.41	0.06	1.06	0.28	0.95	15.16	0.16	0.00	101.05
N=4	2.19	0.00	0.61	0.16	0.07	0.03	0.07	0.12	0.07	0.37	0.07	0.00	
	Fe	Si	Ni	S	Cr	Mn	Co	O	Total	C ^d			
Metal (32)	80.56	0.02	5.38	6.20	0.55	0.19	0.36	0.24	93.50	6.50			
N=6	0.78	0.01	0.46	0.62	0.07	0.03	0.04	0.05	1.21				
#122	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	La ₂ O ₃ ^x		Total
Mg-Pv (22)	59.28	0.08	0.06	0.16	1.70	0.12	38.57	0.19	0.06	0.03	0.02		100.29
N=12	0.82	0.07	0.05	0.13	0.18	0.10	0.67	0.07	0.07	0.04	0.03		1.34
Melt (50)	48.60	0.02	0.08	2.80	6.20	0.29	35.16	1.08	0.92	0.13	2.86		98.15
N=19	1.57	0.02	0.02	0.09	0.39	0.04	1.01	0.11	0.09	0.04	0.21		1.92
	Fe	Si	Ni	S	Cr	Mn	Co	O	Total	C			
Metal (28)	77.38	0.01	9.08	0.40	2.69	0.07	0.24	0.41	90.27	9.73			
N=3	1.18	0.01	0.52	0.07	0.11	0.01	0.01	0.08	1.09				
#108	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	La ₂ O ₃ ^x		Total
Melt (4)	49.30	0.00	8.94	0.55	6.17	1.67	23.87	5.17	2.28	0.29	2.91		100.00
N=5	2.98	0.00	0.48	0.03	1.18	0.14	3.06	1.80	0.76	0.18	2.15		
Fe-poor Mg-Pv (23)	55.49	0.32	5.31	0.10	1.12	0.37	37.34	0.09	0.03	0.02	n.a.		100.25
N=10	0.76	0.21	0.48	0.10	0.23	0.17	0.59	0.08	0.04	0.02			1.08
Fe-rich Mg-Pv (23)	54.91	0.66	5.33	0.20	1.64	0.44	36.51	0.12	0.07	0.03	0.10		100.01

N=7	1.12	0.31	0.52	0.11	0.42	0.10	1.51	0.11	0.07	0.02	0.14	2.45	
	Fe	Si	Ni	S	Cr	Mn	Co	O	Total	C			
Metal (31)	82.57	0.02	5.65	0.03	0.59	0.34	0.19	0.19	89.58	10.42			
N=6	0.62	0.00	0.92	0.02	0.07	0.04	0.02	0.18	0.66				
#129	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	La ₂ O ₃ ^x	Total	
Fe-poor Mg-Pv (2)	58.73	0.13	2.13	0.09	1.66	0.27	38.00	0.06	0.05	0.03	n.a.	101.24	
N=6	0.94	0.05	0.16	0.08	0.37	0.13	0.47	0.05	0.06	0.02		1.05	
Fe-rich Mg-Pv (49)	59.64	0.11	2.76	0.40	3.09	0.61	38.28	0.35	0.17	0.25	n.a.	105.75	
N=9	2.82	0.03	0.17	0.09	0.39	0.14	1.68	0.29	0.23	0.51		4.07	
Melt (4)	48.15	0.06	3.06	0.24	7.41	1.22	21.55	4.01	3.78	7.46	0.65	97.62	
N=2	2.69	0.05	0.12	0.03	0.16	0.04	2.49	0.08	0.05	1.60	0.45	3.31	
	Fe	Si	Ni	S	Cr	Mn	Co	O	Total	C			
Metal (34)	79.91	0.13	4.77	0.02	0.53	0.25	0.17	0.87	86.65	13.35			
N=4	2.68	0.16	0.67	0.02	0.18	0.14	0.05	0.63	2.84				
#103	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	La ₂ O ₃ ^x	S	Total
Fe-rich Mg-Pv (13)	57.34	0.49	2.29	0.78	1.88	0.39	36.56	0.10	0.02	0.04	n.a.	0.03	99.93
N=5	1.25	0.08	0.16	0.22	0.32	0.10	1.10	0.08	0.02	0.03		0.04	2.21
Fe-poor Mg-Pv (1)	58.18	0.24	2.33	0.13	1.31	0.25	37.44	0.07	0.03	0.02	n.a.	0.05	100.09
N=4	0.41	0.03	0.24	0.09	0.15	0.18	0.78	0.06	0.06	0.03		0.05	1.32
Melt (6)	47.57	0.01	2.69	1.68	4.97	1.03	26.42	1.73	1.16	0.49	9.69	0.00	97.45
N=7	2.96	0.01	0.26	0.87	1.10	0.49	3.48	0.51	0.59	0.25	2.96	0.01	1.52
Majorite (40)	57.70	0.02	2.26	0.51	1.88	0.24	36.45	0.02	0.03	0.01	0.03	0.01	99.18
N=6	1.14	0.02	0.08	0.06	0.05	0.04	1.07	0.02	0.02	0.01	0.04	0.01	2.24
Stishovite (9)	98.81	0.03	0.29	0.01	0.06	0.01	0.22	0.01	0.01	0.00	0.00	0.00	99.47
N=3	3.86	0.03	0.05	0.01	0.05	0.01	0.38	0.01	0.01	0.00	0.00	0.00	3.37
	Fe	Si	Ni	S	Cr	Mn	Co	O	Total	C			
Metal (31)	76.48	0.12	5.68	3.79	1.09	0.15	0.25	1.01	88.56	11.45			
N=5	3.00	0.06	0.80	1.81	0.09	0.03	0.03	0.57	2.67				

^a: The FeO content corresponds in fact to the sum of FeO_x in divalent and trivalent Fe oxides. ^b: Number in parentheses : phase proportion determined by mass balance calculations (wt%). ^c: Number of analyses. ^d: Concentration of C in metal determined by subtracting the total concentration of all the other elements to 100 wt%. ^xTo avoid erroneous calculations of the partition coefficients, we initially removed the La₂O₃ content from the phase compositions and normalized compositions to 100%.

Supplementary Table 2 Partition coefficients and degree of melting for equilibria between Bg2 and observed melts and between Bg1 and primary melts, which compositions are calculated instead of measured (see text for more details).

	F (wt%)	Partition coefficient											
		Fe	Al	Si	Mg	Ca	Na	K	Mn	Ti	Cr		
#129 Bg2	6.1	0.43 ±0.10	0.96 ±0.09	1.17 ±0.09	1.63 ±0.35	0.10 ±0.11	0.03 ±1.77	0.05 ±0.27	0.56 ±0.19	2.23 ±0.19	1.53 ±0.02		
#129 Bg1	80.3	0.48	0.78	1.00	1.01	0.11	0.09	0.06	0.47	1.35	0.22		
#104 Bg2	1.5	1.06 ±0.18	0.98 ±0.24	1.09 ±0.02	1.65 ±0.06	0.06 ±0.03	0.02 ±0.05	0.00 ±0.00	1.15 ±9.93	3.18 ±77.94	4.21 ±0.26		
#104 Bg1	29.4	0.35	0.58	1.03	1.20	0.07	0.08	0.02	0.24	1.61	0.14		
#103 Bg2	8.7	0.38 ±0.11	0.85 ±0.10	1.21 ±0.08	1.38 ±0.19	0.06 ±0.05	0.02 ±0.43	0.07 ±0.13	0.38 ±0.99	64.82 ±108	0.46 ±0.34		
#103 Bg1	27.5	0.46	0.96	1.07	1.12	0.11	1.43	0.13	0.72	0.58	0.22		
#108 Bg2	6.1	0.64 ±0.19	0.60 ±0.06	1.09 ±0.07	1.43 ±0.19	0.03 ±0.03	0.03 ±0.03	0.07 ±0.01	0.88 ±3.32	309 ±3991	4.28 ±11.05		
#108 Bg1	13.6	0.23	0.78	1.10	1.28	0.04	0.03	0.16	0.24	0.85	0.07		
#122	69.4	0.27 ±0.03		1.22 ±0.04	1.10 ±0.04	0.17 ±0.06	0.07 ±0.07	0.24 ±0.16	0.40 ±0.11	4.39 ±7.32	0.06 ±0.08		