

## Supplementary Information

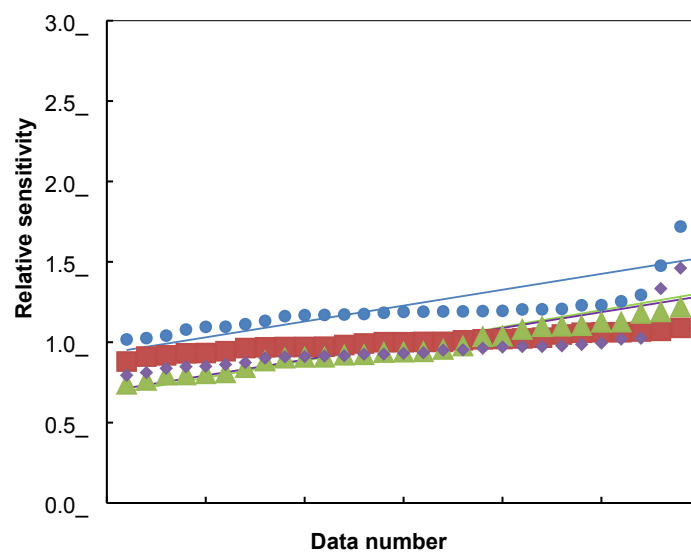
S1 ICP-index list of carbon for all elements (calculated values: in atomic number order) and its calculation modelling data.

Element	ICP-index	Element	ICP-index	Element	ICP-index
H	$2.03 \times 10^5$	As	24.29	Tb	1.90
He	$2.90 \times 10^{13}$	Se	44.87	Dy	1.88
Li	4.67	Br	597.89	Ho	1.93
Be	21.39	Kr	$9.34 \times 10^3$	Er	1.94
B	34.73	Rb	1.15	Tm	2.02
C	$1.26 \times 10^3$	Sr	2.20	Yb	2.04
N	$1.70 \times 10^5$	Y	2.57	Lu	1.82
O	$1.89 \times 10^5$	Zr	2.86	Hf	2.48
F	$6.12 \times 10^7$	Nb	3.12	Ta	3.01
Ne	$2.95 \times 10^8$	Mo	3.51	W	3.36
Na	3.18	Tc	3.86	Re	3.50
Mg	7.74	Ru	4.09	Os	4.56
Al	8.45	Rh	4.39	Ir	6.54
Si	14.25	Pd	5.16	Pt	6.69
P	67.47	Ag	4.85	Au	8.95
S	197.10	Cd	6.57	Hg	15.68
Cl	649.44	In	3.81	Tl	3.45
Ar	$3.38 \times 10^5$	Sn	5.57	Pb	4.33
K	1.60	Sb	8.91	Bi	4.98
Ca	3.38	Te	12.68	Po	7.42
Sc	3.92	I	44.34	At	14.63
Ti	4.38	Xe	274.72	Rn	25.00
V	4.52	Cs	0.79	Fr	0.93
Cr	4.77	Ba	1.41	Ra	1.60
Mn	5.57	La	2.39	Ac	1.95
Fe	6.26	Ce	2.60	Th	2.73
Co	6.59	Pr	1.54	Pa	2.54
Ni	6.78	Nd	2.13	U	2.77
Cu	7.14	Pm	2.17	Np	2.82
Zn	10.99	Sm	1.67	Pu	2.71
Ga	5.60	Eu	1.77	Am	2.67
Ge	9.07	Gd	1.88	Cm	2.69

Element	Atomic Radii (m)	Atomic mass	k	T (K)	p (Pa)	CRC handbook 1st IP (eV)	Saha equation
H	5.30E-11	1.01	1.38E-23	6680	133	13.60	0.0004
He	3.10E-11	4.00	1.38E-23	6680	133	24.59	0.0000
Li	1.67E-10	6.94	1.38E-23	6680	133	5.39	0.9985
Be	1.12E-10	9.01	1.38E-23	6680	133	9.32	0.7536
B	8.70E-11	10.81	1.38E-23	6680	133	8.30	0.6203
C	6.70E-11	12.01	1.38E-23	6680	133	11.26	0.0345
N	5.60E-11	14.01	1.38E-23	6680	133	14.53	0.0004
O	4.80E-11	16.00	1.38E-23	6680	133	13.62	0.0004
F	4.20E-11	19.00	1.38E-23	6680	133	17.42	0.0000
Ne	3.80E-11	20.18	1.38E-23	6680	133	21.56	0.0000
Na	1.90E-10	22.99	1.38E-23	6680	133	5.14	0.9991
Mg	1.45E-10	24.31	1.38E-23	6680	133	7.65	0.9825
Al	1.18E-10	26.98	1.38E-23	6680	133	5.99	0.9892
Si	1.11E-10	28.09	1.38E-23	6680	133	8.15	0.8790
P	9.80E-11	30.97	1.38E-23	6680	133	10.49	0.2879
S	8.80E-11	32.07	1.38E-23	6680	133	10.36	0.1147
Cl	7.90E-11	35.45	1.38E-23	6680	133	12.97	0.0504
Ar	7.10E-11	39.95	1.38E-23	6680	133	15.76	0.0001
K	2.43E-10	39.10	1.38E-23	6680	133	4.34	0.9997
Ca	1.94E-10	40.08	1.38E-23	6680	133	6.11	0.9986
Sc	1.84E-10	44.96	1.38E-23	6680	133	6.56	0.9971
Ti	1.76E-10	47.87	1.38E-23	6680	133	6.83	0.9949
V	1.71E-10	50.94	1.38E-23	6680	133	6.75	0.9923
Cr	1.66E-10	52.00	1.38E-23	6680	133	6.77	0.9889
Mn	1.61E-10	54.94	1.38E-23	6680	133	7.43	0.9710
Fe	1.56E-10	55.85	1.38E-23	6680	133	7.90	0.9677
Co	1.52E-10	58.93	1.38E-23	6680	133	7.88	0.9483
Ni	1.49E-10	58.69	1.38E-23	6680	133	7.64	0.9255
Cu	1.45E-10	63.55	1.38E-23	6680	133	7.73	0.9159
Zn	1.42E-10	65.38	1.38E-23	6680	133	9.39	0.7450
Ga	1.36E-10	69.72	1.38E-23	6680	133	6.00	0.9900
Ge	1.25E-10	72.64	1.38E-23	6680	133	7.90	0.9164
As	1.14E-10	74.92	1.38E-23	6680	133	9.79	0.4887
Se	1.03E-10	78.96	1.38E-23	6680	133	9.75	0.3053
Br	9.40E-11	79.90	1.38E-23	6680	133	11.81	0.0318
Kr	8.80E-11	83.80	1.38E-23	6680	133	14.00	0.0026
Rb	2.65E-10	85.47	1.38E-23	6680	133	4.18	0.9998
Sr	2.19E-10	87.62	1.38E-23	6680	133	5.69	0.9992
Y	2.12E-10	88.91	1.38E-23	6680	133	6.22	0.9899
Zr	2.06E-10	91.22	1.38E-23	6680	133	6.63	0.9931
Nb	1.98E-10	92.91	1.38E-23	6680	133	6.76	0.9894

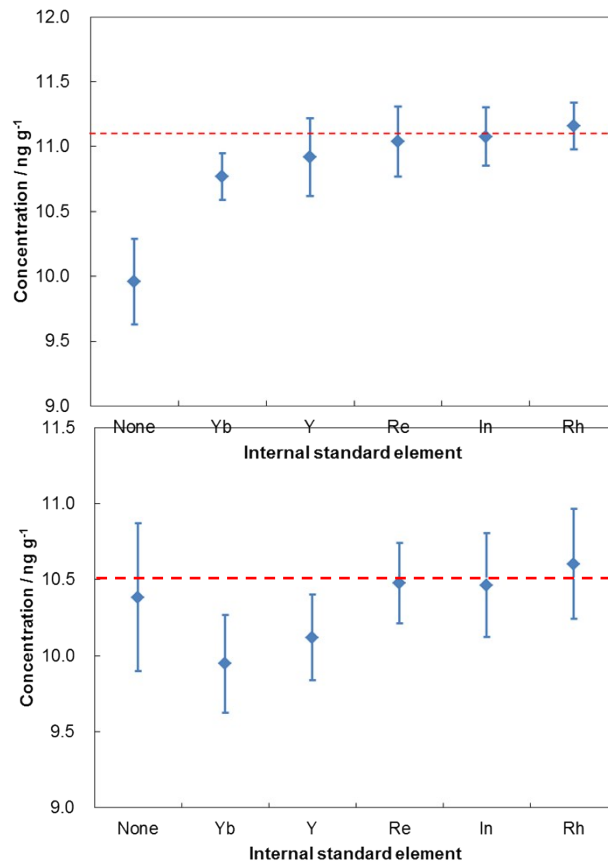
Mo	1.90E-10	95.96	1.38E-23	6680	133	7.09	0.9854
Tc	1.83E-10	99.00	1.38E-23	6680	133	7.28	0.9750
Ru	1.78E-10	101.10	1.38E-23	6680	133	7.36	0.9699
Rh	1.73E-10	102.90	1.38E-23	6680	133	7.46	0.9587
Pd	1.69E-10	106.40	1.38E-23	6680	133	8.34	0.9421
Ag	1.65E-10	107.90	1.38E-23	6680	133	7.58	0.9445
Cd	1.61E-10	112.40	1.38E-23	6680	133	8.99	0.8543
In	1.56E-10	114.80	1.38E-23	6680	133	5.79	0.9942
Sn	1.45E-10	118.70	1.38E-23	6680	133	7.34	0.9672
Sb	1.33E-10	121.80	1.38E-23	6680	133	8.61	0.8107
Te	1.23E-10	127.60	1.38E-23	6680	133	9.01	0.6674
I	1.15E-10	126.90	1.38E-23	6680	133	10.45	0.2465
Xe	1.08E-10	131.30	1.38E-23	6680	133	12.13	0.0504
Cs	2.98E-10	132.90	1.38E-23	6680	133	3.89	0.9998
Ba	2.53E-10	137.30	1.38E-23	6680	133	5.21	0.9996
La	1.95E-10	138.90	1.38E-23	6680	133	5.58	0.9991
Ce	1.85E-10	140.10	1.38E-23	6680	133	5.54	0.9971
Pr	2.47E-10	140.90	1.38E-23	6680	133	5.47	0.9985
Nd	2.06E-10	144.20	1.38E-23	6680	133	5.53	0.9971
Pm	2.05E-10	145.00	1.38E-23	6680	133	5.58	0.9991
Sm	2.38E-10	150.40	1.38E-23	6680	133	5.64	0.9992
Eu	2.31E-10	152.00	1.38E-23	6680	133	5.68	0.9992
Gd	2.33E-10	157.30	1.38E-23	6680	133	6.15	0.9938
Tb	2.25E-10	158.90	1.38E-23	6680	133	5.86	0.9942
Dy	2.28E-10	162.50	1.38E-23	6680	133	5.94	0.9892
Ho	2.26E-10	164.90	1.38E-23	6680	133	6.02	0.9892
Er	2.26E-10	167.30	1.38E-23	6680	133	6.11	0.9938
Tm	2.22E-10	168.90	1.38E-23	6680	133	6.18	0.9938
Yb	2.22E-10	173.10	1.38E-23	6680	133	6.25	0.9899
Lu	2.17E-10	175.00	1.38E-23	6680	133	5.43	0.9985
Hf	2.08E-10	178.50	1.38E-23	6680	133	6.83	0.9889
Ta	2.00E-10	180.90	1.38E-23	6680	133	7.55	0.9604
W	1.93E-10	183.80	1.38E-23	6680	133	7.86	0.9486
Re	1.88E-10	186.20	1.38E-23	6680	133	7.83	0.9454
Os	1.85E-10	190.20	1.38E-23	6680	133	8.44	0.7986
Ir	1.80E-10	192.20	1.38E-23	6680	133	8.97	0.6183
Pt	1.77E-10	195.10	1.38E-23	6680	133	8.96	0.6183
Au	1.74E-10	197.00	1.38E-23	6680	133	9.23	0.4887
Hg	1.71E-10	200.60	1.38E-23	6680	133	10.44	0.3231
Tl	1.56E-10	204.40	1.38E-23	6680	133	6.11	0.9938
Pb	1.54E-10	207.20	1.38E-23	6680	133	7.42	0.9793
Bi	1.43E-10	209.00	1.38E-23	6680	133	7.29	0.9414
Po	1.35E-10	210.00	1.38E-23	6680	133	8.41	0.7986
At	1.27E-10	210.00	1.38E-23	6680	133	9.23	0.4887

Rn	1.20E-10	222.00	1.38E-23	6680	133	10.75	0.3574
Fr	2.60E-10	223.00	1.38E-23	6680	133	4.07	0.9998
Ra	2.21E-10	226.00	1.38E-23	6680	133	5.28	0.9995
Ac	1.95E-10	227.00	1.38E-23	6680	133	5.17	0.9991
Th	1.80E-10	232.00	1.38E-23	6680	133	6.31	0.9899
Pa	1.80E-10	231.00	1.38E-23	6680	133	5.89	0.9942
U	1.75E-10	238.00	1.38E-23	6680	133	6.19	0.9938
Np	1.75E-10	237.00	1.38E-23	6680	133	6.27	0.9899
Pu	1.75E-10	239.00	1.38E-23	6680	133	6.03	0.9900
Am	1.75E-10	243.00	1.38E-23	6680	133	5.97	0.9892
Cm	1.74E-10	247.00	1.38E-23	6680	133	5.99	0.9892



S2 Signal variation rate for each element in the presence of carbon. (in ascending order)

- After regression correction with ICP-index (Standard deviation 0.056, Relative standard deviation 5.6 %), ▲ After regression correction with 1st IP (Standard deviation 0.231, Relative standard deviation 23.1 %), ◆ After regression correction with atomic mass (Standard deviation 0.275, Relative standard deviation 27.5 %), ● Signal variation of all 30 elements (Average rate 1.240, Standard deviation 0.279, Relative standard deviation 22.5 %).



Element	ICP-index of K	Element	ICP-index of Mg
K	3.31	Yb	2.75
Yb	4.11	Y	3.43
Y	5.08	Re	4.55
Re	6.52	In	4.74
In	6.53	Rh	5.61
Rh	7.93	Mg	9.44
As	34.98	As	27.66

S3 Internal standard element dependence in the measurement of As in a matrix of K and Mg.

(Upper figure) K 100 mg kg<sup>-1</sup> matrix, (Lower figure) Mg 100 mg kg<sup>-1</sup> matrix, Red dotted line: Calculation value, X-axis: None indicates no internal standard correction, Yb, Y, Re, In, and Rh were corrected as internal standard elements, Bar: Standard uncertainty in the measurement (*n*=3)

S4 ICP-index list of Ar for all elements. (calculated values: in atomic number order)

Element	ICP-index	Element	ICP-index	Element	ICP-index
H	$1.43 \times 10^5$	As	21.33	Tb	1.71
He	$2.09 \times 10^{13}$	Se	39.86	Dy	1.70
Li	3.45	Br	535.17	Ho	1.74
Be	16.04	Kr	$8.44 \times 10^3$	Er	1.76
B	26.41	Rb	0.98	Tm	1.83
C	970.06	Sr	1.89	Yb	1.86
N	$1.33 \times 10^5$	Y	2.21	Lu	1.66
O	$1.51 \times 10^5$	Zr	2.47	Hf	2.27
F	$4.99 \times 10^7$	Nb	2.70	Ta	2.76
Ne	$2.43 \times 10^8$	Mo	3.06	W	3.09
Na	2.49	Tc	3.38	Re	3.23
Mg	6.12	Ru	3.59	Os	4.22
Al	6.78	Rh	3.87	Ir	6.06
Si	11.50	Pd	4.56	Pt	6.22
P	55.23	Ag	4.30	Au	8.33
S	162.71	Cd	5.86	Hg	14.64
Cl	544.36	In	3.41	Tl	3.25
Ar	$2.89 \times 10^5$	Sn	5.02	Pb	4.08
K	1.29	Sb	8.09	Bi	4.71
Ca	2.75	Te	11.62	Po	7.05
Sc	3.22	I	40.81	At	13.97
Ti	3.62	Xe	254.81	Rn	24.09
V	3.75	Cs	0.69	Fr	0.86
Cr	3.98	Ba	1.25	Ra	1.49
Mn	4.67	La	2.14	Ac	1.82
Fe	5.26	Ce	2.34	Th	2.57
Co	5.57	Pr	1.37	Pa	2.39
Ni	5.73	Nd	1.92	U	2.62
Cu	6.09	Pm	1.95	Np	2.67
Zn	9.41	Sm	1.50	Pu	2.56
Ga	4.83	Eu	1.59	Am	2.53
Ge	7.90	Gd	1.69	Cm	2.55

S5 ICP-index list of Li for all elements. (calculated values: in atomic number order)

Element	ICP-index	Element	ICP-index	Element	ICP-index
H	$1.94 \times 10^5$	As	23.79	Tb	2.33
He	$1.83 \times 10^{13}$	Se	41.32	Dy	2.31
Li	7.01	Br	522.28	Ho	2.36
Be	26.80	Kr	$7.81 \times 10^3$	Er	2.37
B	37.51	Rb	1.59	Tm	2.45
C	1152.87	Sr	2.84	Yb	2.46
N	$1.36 \times 10^5$	Y	3.26	Lu	2.18
O	$1.35 \times 10^5$	Zr	3.58	Hf	2.91
F	$3.94 \times 10^7$	Nb	3.85	Ta	3.47
Ne	$1.77 \times 10^8$	Mo	4.24	W	3.81
Na	4.49	Tc	4.58	Re	3.92
Mg	9.79	Ru	4.79	Os	5.07
Al	9.59	Rh	5.06	Ir	7.17
Si	15.60	Pd	5.86	Pt	7.27
P	68.26	Ag	5.45	Au	9.64
S	186.79	Cd	7.27	Hg	16.74
Cl	569.94	In	4.15	Tl	3.53
Ar	$2.74 \times 10^5$	Sn	5.83	Pb	4.39
K	2.32	Sb	8.91	Bi	4.86
Ca	4.54	Te	12.12	Po	7.04
Sc	5.10	I	40.94	At	13.46
Ti	5.55	Xe	244.25	Rn	22.20
V	5.62	Cs	1.08	Fr	1.16
Cr	5.85	Ba	1.83	Ra	1.88
Mn	6.70	La	2.80	Ac	2.17
Fe	7.41	Ce	2.98	Th	2.93
Co	7.66	Pr	1.98	Pa	2.73
Ni	7.81	Nd	2.55	U	2.94
Cu	8.05	Pm	2.58	Np	2.99
Zn	12.23	Sm	2.10	Pu	2.87
Ga	6.05	Eu	2.20	Am	2.83
Ge	9.36	Gd	2.33	Cm	2.84

S6 ICP-index list of Pb for all elements. (calculated values: in atomic number order)



Element	ICP-index	Element	ICP-index	Element	ICP-index
H	$1.62 \times 10^5$	As	37.89	Tb	3.68
He	$1.82 \times 10^{13}$	Se	69.08	Dy	3.65
Li	6.12	Br	902.62	Ho	3.76
Be	25.70	Kr	$1.40 \times 10^4$	Er	3.79
B	38.88	Rb	2.05	Tm	3.95
C	1284.04	Sr	3.88	Yb	4.00
N	$1.63 \times 10^5$	Y	4.51	Lu	3.57
O	$1.72 \times 10^5$	Zr	5.03	Hf	4.85
F	$5.39 \times 10^7$	Nb	5.48	Ta	5.88
Ne	$2.51 \times 10^8$	Mo	6.17	W	6.56
Na	4.65	Tc	6.79	Re	6.83
Mg	10.85	Ru	7.20	Os	8.91
Al	11.44	Rh	7.72	Ir	12.76
Si	19.10	Pd	9.08	Pt	13.07
P	88.56	Ag	8.54	Au	17.47
S	251.85	Cd	11.61	Hg	30.66
Cl	814.34	In	6.73	Tl	6.70
Ar	$4.17 \times 10^5$	Sn	9.78	Pb	8.40
K	2.55	Sb	15.50	Bi	9.57
Ca	5.28	Te	21.94	Po	14.15
Sc	6.17	I	75.70	At	27.65
Ti	6.90	Xe	466.07	Rn	47.23
V	7.14	Cs	1.52	Fr	1.93
Cr	7.53	Ba	2.70	Ra	3.28
Mn	8.82	La	4.46	Ac	3.93
Fe	9.88	Ce	4.83	Th	5.49
Co	10.44	Pr	2.95	Pa	5.10
Ni	10.70	Nd	4.03	U	5.59
Cu	11.35	Pm	4.10	Np	5.68
Zn	17.49	Sm	3.22	Pu	5.46
Ga	8.94	Eu	3.40	Am	5.40
Ge	14.34	Gd	3.64	Cm	5.45