

Table S2 Complete $^{40}\text{Ar}/^{39}\text{Ar}$ data of the ZMT04 muscovite.

ZMT04-1, Analysed in GIGCAS, October 2021, J value = $0.0038510 \pm 0.0.0000039$

Step	Laser power	Step marked ¹	$^{36}\text{Ar}_{\text{air}}$ fA	$^{37}\text{Ar}_{\text{Ca}}$ fA	$^{38}\text{Ar}_{\text{Cl}}$ fA	$^{39}\text{Ar}_{\text{K}}$ fA	$^{40}\text{Ar}^{*2}$ fA	Age (Ma)	$\pm 2s$	$^{40}\text{Ar}(r)$ (%)	$^{39}\text{Ar}(k)$ (%)	K/Ca	$\pm 2s$
1	2.5		29.363	0.000	0.259	43.717	19093.300	1783.95	10.83	68.53	0.33	1.3	0.39
2	3.5		7.767	0.000	0.200	75.569	33065.622	1786.05	5.90	93.45	0.58	2.1	0.60
3	4.0 %	Δ	9.036	4.766	0.651	228.609	99009.131	1774.43	2.90	97.35	1.74	20.6	42.56
4	4.4 %	Δ	4.569	5.666	0.552	198.371	85964.329	1775.11	3.17	98.44	1.51	15.1	26.20
5	4.7 %	Δ	1.401	2.976	0.330	121.133	52458.052	1774.35	3.98	99.21	0.92	17.5	58.69
6	5.0 %	Δ	5.665	11.244	0.804	304.131	131692.588	1774.22	2.65	98.73	2.32	11.6	10.32
7	5.4 %	Δ	2.778	8.958	0.694	278.857	120800.861	1774.71	2.81	99.32	2.13	13.4	15.13
8	5.7 %	Δ	3.448	4.764	0.598	233.900	101329.259	1774.76	2.84	98.99	1.78	21.1	44.56
9	6.0 %	Δ	5.071	12.115	0.993	389.289	168663.163	1774.87	2.51	99.11	2.97	13.8	11.39
10	6.4 %	Δ	3.392	6.046	0.893	390.219	169073.781	1774.92	2.53	99.40	2.97	27.8	47.11
11	6.7 %	Δ	3.732	8.322	1.175	458.462	198565.252	1774.48	2.45	99.44	3.49	23.7	28.78
12	7.0 %	Δ	4.748	20.428	1.445	532.560	230960.017	1775.96	2.43	99.39	4.06	11.2	6.09
13	7.4 %	Δ	4.432	10.051	1.584	589.596	255423.385	1774.76	2.41	99.48	4.49	25.2	25.72
14	7.8 %	Δ	4.818	28.152	1.937	677.451	293651.038	1775.40	2.41	99.51	5.16	10.3	4.15
15	8.3 %	Δ	3.075	25.328	1.702	577.497	250134.036	1774.54	2.41	99.63	4.40	9.8	4.61
16	8.5 %	Δ	3.355	15.314	1.682	616.057	266932.659	1774.95	2.42	99.63	4.70	17.3	12.41
17	9.0 %	Δ	4.451	30.895	2.162	752.757	326468.267	1776.01	2.37	99.59	5.74	10.5	3.71
18	9.4 %	Δ	2.695	16.070	1.889	647.391	280455.703	1774.74	2.42	99.71	4.93	17.3	12.00
19	9.7 %	Δ	2.144	6.622	1.333	495.334	214538.019	1774.50	2.50	99.70	3.78	32.2	50.45
20	10.0 %	Δ	2.995	12.030	1.618	555.170	240616.733	1775.26	2.46	99.63	4.23	19.8	18.75
21	10.3 %	Δ	1.615	11.296	1.435	487.971	211348.312	1774.49	2.46	99.77	3.72	18.6	18.47
22	10.6 %	Δ	1.357	4.500	1.191	463.071	200606.760	1774.74	2.48	99.80	3.53	44.3	111.05
23	11.0 %	Δ	1.123	6.552	1.172	421.088	182413.199	1774.70	2.51	99.82	3.21	27.6	43.89
24	11.3 %	Δ	1.327	4.678	1.174	417.961	181074.205	1774.80	2.50	99.78	3.19	38.4	91.16
25	11.6 %	Δ	0.871	6.175	0.918	382.516	165673.532	1774.49	2.57	99.84	2.92	26.6	46.95
26	12.0 %	Δ	0.979	4.921	1.117	428.510	185675.312	1774.98	2.55	99.84	3.27	37.4	79.03
27	12.5 %	Δ	1.187	9.946	1.357	492.404	213265.505	1774.48	2.52	99.83	3.75	21.3	21.96
28	13.0 %	Δ	0.746	2.867	1.013	419.670	181895.300	1775.30	2.57	99.88	3.20	62.9	230.08
29	13.5 %	Δ	0.897	8.846	1.306	483.172	209291.242	1774.61	2.52	99.87	3.68	23.5	27.20
30	14.1 %	Δ	0.808	15.695	1.382	495.087	214557.823	1775.17	2.51	99.89	3.77	13.6	9.42
31	14.7 %	Δ	0.677	8.733	1.032	462.559	200623.632	1776.08	2.51	99.90	3.53	22.8	28.89

ZMT04-2, Analysed in Curtin University, May 2023, Singal-grain stepwise heating results, J value = 0.0164368 ± 0.0000090

Step	Laser power	Step marked ¹	$^{36}\text{Ar}_{\text{air}}$ V	$^{37}\text{Ar}_{\text{Ca}}$ V	$^{38}\text{Ar}_{\text{Cl}}$ V	$^{39}\text{Ar}_{\text{K}}$ V	$^{40}\text{Ar}^{*2}$ V	Age (Ma)	$\pm 2s$	$^{40}\text{Ar}(r)$ (%)	$^{39}\text{Ar}(k)$ (%)	K/Ca	$\pm 2s$
1	0.5 %	Δ	0.0000102	0.0004570	0.0000000	0.0003152	0.036007	1911.28	235.63	92.19	0.17	0.36	12.97
2	0.8 %	Δ	0.0001524	0.0033466	0.0000000	0.0049319	0.507253	1789.62	14.64	91.77	2.65	0.77	3.63
3	1.0 %	Δ	0.0000093	0.0000136	0.0000000	0.0150525	1.526984	1774.00	4.92	99.82	8.09	577.24	596691.58
4	1.2 %	Δ	0.0000033	0.0032943	0.0000000	0.0127846	1.298432	1775.31	5.94	99.92	6.87	2.02	10.81
5	1.4 %	Δ	0.0000032	0.0012695	0.0000361	0.0106711	1.079984	1771.35	6.85	99.91	5.74	4.37	44.06
6	1.6 %	Δ	0.0000004	0.0073950	0.0000000	0.0070128	0.712141	1775.16	10.35	99.98	3.77	0.49	0.91
7	1.8 %	Δ	0.0000031	0.0114302	0.0000095	0.0011087	0.113734	1786.65	65.49	100.83	0.60	0.05	0.08
8	2.1 %	Δ	0.0000011	0.0054748	0.0000957	0.0003962	0.041571	1812.47	183.15	100.81	0.21	0.04	0.10

9	2.4 %	Δ	0.0000018	0.0077013	0.0000000	0.0000542	0.009041	2386.38	1497.14	106.33	0.03	0.00	0.01
10	2.8 %	Δ	0.0000019	0.0048388	0.0000239	0.0000338	0.003527	1807.35	2170.44	86.33	0.02	0.00	0.01
11	3.5 %	Δ	0.0000009	0.0033273	0.0000255	0.0000219	0.002106	1712.79	3169.20	88.70	0.01	0.00	0.02
12	5.0 %		0.0000012	0.0021417	0.0000000	0.0000100	0.000008	23.90	4411.79	2.22	0.01	0.00	0.02
13	6.0 %		0.0000010	0.0042665	0.0000000	0.0000214	0.000617	1158.44	6168.98	185.85	0.01	0.00	0.01
14	6.5 %		0.0000002	0.0004796	0.0000520	0.0000195	0.000229	388.03	3161.54	146.04	0.01	0.02	0.65
15	7.0 %		0.0000017	0.0037281	0.0000000	0.0000221	0.000561	975.44	5095.27	860.17	0.01	0.00	0.01
16	10.0 %		0.0000010	0.0028380	0.0000022	0.0000012	0.000026	570.66	37275.42	7.90	0.00	0.00	0.01
17	20.0 %		0.0000011	0.0025577	0.0000000	0.0000024	0.000214	0.00	155639.13	38.48	0.00	0.00	0.01
18	35.0 %		0.0000005	0.0088743	0.0000000	0.0000052	0.001042	0.00	31560.75	115.13	0.00	0.00	0.00
1	0.5 %		0.0000007	0.0013034	0.0000000	0.0000677	0.005329	1501.04	390.02	96.32	0.04	0.03	0.24
2	0.8 %		0.0000097	0.0003586	0.0000000	0.0000842	0.089200	1823.13	40.34	96.85	0.45	1.22	36.89
3	1.0 %		0.0000307	0.0032660	0.0000572	0.0063458	0.647789	1781.09	5.43	98.60	3.41	1.01	3.03
4	1.2 %	Δ	0.0000424	0.0042610	0.0000141	0.0375639	3.803742	1771.95	1.31	99.67	20.19	4.58	14.03
5	1.4 %	Δ	0.0000079	0.0016695	0.0000405	0.0200208	2.026648	1771.58	1.88	99.88	10.76	6.24	34.36
6	1.6 %	Δ	0.0000122	0.0011335	0.0000108	0.0306207	3.097190	1770.68	1.20	99.88	16.46	14.05	111.81
7	1.8 %	Δ	0.0000089	0.0043175	0.0000000	0.0159407	1.612035	1770.46	1.91	99.84	8.57	1.92	5.06
8	2.1 %	Δ	0.0000094	0.0084757	0.0000269	0.0098878	0.999963	1770.51	2.47	99.72	5.32	0.61	0.66
9	2.4 %	Δ	0.0000028	0.0004353	0.0000666	0.0062762	0.635350	1771.64	4.63	99.87	3.37	7.50	154.87
10	2.8 %	Δ	0.0000015	0.0019746	0.0000219	0.0024959	0.253978	1777.49	12.25	99.83	1.34	0.66	3.13
11	3.5 %		0.0000015	0.0008251	0.0000192	0.0019183	0.197216	1789.11	17.16	99.77	1.03	1.21	17.28
12	5.0 %		0.0000019	0.0041607	0.0000519	0.0002717	0.028892	1827.78	87.60	98.12	0.15	0.03	0.08
13	6.0 %		0.0000035	0.0076462	0.0000253	0.0001502	0.014871	1746.52	180.99	93.44	0.08	0.01	0.01
14	6.5 %		0.0000028	0.0036675	0.0000095	0.0000361	0.004768	2087.21	851.53	85.18	0.02	0.01	0.01
15	7.0 %		0.0000030	0.0043518	0.0000211	0.0000223	0.002388	1834.11	1053.17	72.94	0.01	0.00	0.01
16	10.0 %		0.0000088	0.0049895	0.0000732	0.0000266	0.001812	1358.14	875.45	40.80	0.01	0.00	0.01
17	20.0 %		0.0000703	0.0058395	0.0000000	0.0004989	0.035763	1407.65	49.61	63.00	0.27	0.04	0.09
18	35.0 %		0.0001245	0.0083363	0.0000000	0.0007300	0.027715	876.83	33.56	42.72	0.39	0.05	0.06

ZMT04-2, Analysed in Curtin University, January 2024, Singal-grain total fusion results, J value = 0.0164368 ± 0.0000090

Grain	Laser power	Step marked †	³⁶ Ar _{air} V	³⁷ Ar _{Ca} V	³⁸ Ar _{Cl} V	³⁹ Ar _K V	⁴⁰ Ar* ² V	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	8.0 %	Δ	0.0002596	0.0000155	0.0000314	0.1540169	15.57246	1770.26	0.78	99.50	4.89	5182	17540.71
2	10.0 %	Δ	0.0004086	0.0000252	0.0000000	0.3027839	30.61876	1770.43	1.20	99.60	9.61	6252	16608.78
3	8.0 %	Δ	0.0003230	0.0000377	0.0000000	0.0532531	5.38725	1770.87	1.19	98.24	1.69	734	1215.31
4	8.0 %	Δ	0.0002026	0.0000311	0.0000238	0.1131360	11.45025	1771.37	0.92	99.47	3.59	1890	3189.78
5	8.0 %	Δ	0.0000900	0.0000161	0.0000302	0.0408535	4.13720	1772.05	1.43	99.35	1.30	1317	4183.05
6	8.0 %	Δ	0.0001874	0.0000012	0.0000000	0.0456274	4.62332	1772.70	1.28	98.80	1.45	19273	946948.98
7	10.0 %	Δ	0.0007781	0.0000199	0.0000000	0.4473488	45.33098	1772.76	1.21	99.49	14.20	11663	36711.28
8	8.0 %	Δ	0.0001110	0.0000001	0.0000401	0.0940566	9.53162	1772.83	0.92	99.65	2.98	460386	276830796.18
9	8.0 %	Δ	0.0000964	0.0000324	0.0000000	0.0684391	6.93626	1772.94	1.06	99.59	2.17	1099	1714.54
10	8.0 %	Δ	0.0001749	0.0000032	0.0000044	0.1205458	12.22041	1773.24	0.84	99.57	3.83	19847	406895.49
11	8.0 %	Δ	0.0001919	0.0000506	0.0000063	0.1224101	12.42160	1774.35	0.91	99.54	3.88	1258	1237.05
12	15.0 %	Δ	0.0003858	0.0000147	0.0000000	0.0822162	8.35178	1775.55	1.15	98.64	2.61	2912	11159.73
13	8.0 %	Δ	0.0004782	0.0000118	0.0000000	0.0956386	9.71980	1776.08	0.98	98.55	3.04	4213	16909.60
14	8.0 %	Δ	0.0001916	0.0000336	0.0000000	0.0296722	3.01608	1776.25	1.79	98.14	0.94	459	740.63
15	8.0 %	Δ	0.0001890	0.0000263	0.0000000	0.1143278	11.62222	1776.37	0.87	99.52	3.63	2259	4621.64
16	10.0 %	Δ	0.0009054	0.0000274	0.0000255	0.4367761	44.41695	1776.77	1.21	99.39	13.86	8277	20471.26

17	8.0 %	Δ	0.0001190	0.0000090	0.0000069	0.0613706	6.24314	1777.17	1.19	99.43	1.95	3537	16984.34
18	10.0 %	Δ	0.0006408	0.0000009	0.0000000	0.3126979	31.83639	1778.09	1.26	99.40	9.92	187347	18413111.18
19	8.0 %		0.0000578	0.0000374	0.0000000	0.0403513	4.12975	1784.01	1.57	99.58	1.28	561	770.46
20	8.0 %		0.0004032	0.0000128	0.0000000	0.4155151	42.77220	1790.57	0.72	99.72	13.19	16852	61800.43

ZMT04-3, Analysed in GIGCAS, September 2023, J value = 0.0010683 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar ^{*2} fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.5 %		5.956	0.000	0.055	3.236	4770.204	1710.04	58.03	73.05	0.19		
2	4.5 %		3.765	0.000	0.267	13.030	20489.242	1782.47	15.32	94.85	0.78		
3	6.0 %	Δ	8.454	0.000	0.487	36.297	56510.847	1771.23	6.99	95.77	2.16		
4	7.5 %	Δ	4.342	0.000	0.728	55.526	86425.968	1770.92	5.84	98.54	3.31		
5	9.0 %	Δ	3.219	0.000	0.874	65.021	101407.832	1773.19	5.43	99.07	3.87		
6	10.5 %	Δ	10.461	0.000	1.006	70.997	110934.984	1775.29	5.31	97.29	4.23		
7	11.5 %	Δ	4.692	0.000	0.886	61.726	96579.829	1776.83	5.69	98.58	3.68		
8	12.5 %	Δ	4.606	0.000	0.914	63.628	98874.447	1769.07	5.53	98.64	3.79		
9	13.5 %	Δ	6.627	0.000	0.868	60.335	93881.211	1770.57	5.59	97.96	3.59		
10	14.5 %	Δ	4.242	0.000	0.867	60.954	95032.682	1772.81	5.62	98.70	3.63		
11	15.5 %	Δ	4.613	0.000	1.053	76.248	118788.937	1771.96	5.23	98.86	4.54		
12	16.5 %	Δ	2.935	0.000	0.758	51.004	79598.039	1773.91	6.00	98.92	3.04		
13	17.5 %	Δ	3.604	0.000	0.678	50.095	78206.543	1774.30	6.17	98.66	2.98		
14	19.0 %	Δ	2.611	0.000	0.788	57.672	90041.219	1774.37	5.78	99.15	3.43		
15	20.5 %	Δ	1.797	0.000	0.823	59.031	92036.790	1772.82	5.52	99.43	3.52		
16	22.0 %	Δ	1.081	0.000	0.730	54.031	84280.861	1773.37	5.85	99.62	3.22		
17	24.0 %	Δ	1.311	0.000	1.086	80.463	125769.337	1775.68	5.16	99.69	4.79		
18	26.0 %	Δ	0.873	0.000	1.093	82.443	128850.987	1775.56	5.20	99.80	4.91		
19	28.0 %	Δ	0.558	0.000	1.257	88.243	138001.661	1776.27	5.08	99.88	5.25		
20	30.0 %	Δ	0.437	0.000	1.332	97.885	153036.131	1775.95	5.02	99.91	5.83		
21	32.0 %	Δ	0.582	0.000	1.624	111.726	174387.028	1774.07	4.87	99.90	6.65		
22	34.0 %	Δ	0.616	0.000	1.770	125.757	196488.970	1775.24	4.78	99.91	7.49		
23	36.0 %	Δ	0.334	0.000	1.864	128.829	200928.488	1773.21	4.88	99.95	7.67		
24	38.0 %	Δ	0.280	0.000	1.809	125.133	195028.836	1772.43	4.82	99.96	7.45		

ZMT04-4, Analysed in GIGCAS, September 2023, J value = 0.0010683 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar ^{*2} fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.5 %		4.523	0.000	0.013	1.385	1689.456	1519.98	207.05	55.83	0.13	0.42	2.25
2	4.5 %	Δ	2.411	0.000	0.047	4.489	6958.498	1778.70	69.55	90.71	0.43		
3	6.0 %	Δ	5.465	0.000	0.213	18.326	28575.070	1785.36	20.10	94.65	1.75		
4	7.5 %	Δ	5.170	0.000	0.548	46.581	71588.598	1768.99	11.43	97.91	4.46		
5	9.0 %	Δ	3.475	0.000	0.608	49.758	76766.488	1773.35	11.86	98.68	4.76		
6	10.5 %	Δ	3.962	0.000	0.718	55.793	86270.388	1775.88	10.78	98.66	5.34		
7	11.5 %	Δ	4.139	0.000	0.733	55.580	86080.094	1777.70	10.59	98.60	5.32		
8	12.5 %	Δ	4.724	0.000	0.713	58.765	91627.237	1785.32	10.67	98.50	5.63		
9	13.5 %	Δ	2.352	0.000	0.753	60.598	94452.203	1784.94	10.85	99.27	5.80		
10	14.5 %	Δ	3.415	0.000	0.643	51.360	80226.138	1787.38	11.48	98.76	4.92		
11	16.0 %	Δ	2.515	0.000	0.788	63.811	99402.657	1784.27	10.42	99.26	6.11		
12	17.5 %	Δ	3.099	0.000	0.619	51.094	79703.386	1785.85	11.24	98.86	4.89		

13	19.0 %	Δ	5.379	0.000	0.559	47.409	73726.838	1782.36	11.82	97.89	4.54
14	21.0 %	Δ	5.545	0.000	0.817	63.434	98078.505	1775.80	10.38	98.36	6.07
15	23.0 %	Δ	3.350	0.000	0.721	59.472	91947.156	1775.73	10.49	98.93	5.69
16	25.0 %	Δ	3.497	0.000	0.655	54.598	83888.776	1768.71	11.03	98.78	5.23
17	27.0 %	Δ	4.205	0.000	0.714	60.813	93125.610	1764.94	10.55	98.68	5.82
18	29.0 %	Δ	2.801	0.000	0.651	54.105	83093.537	1768.19	11.41	99.01	5.18
19	31.0 %	Δ	1.821	0.000	0.532	43.415	66771.389	1769.82	11.65	99.20	4.16
20	34.0 %	Δ	1.743	0.000	0.738	56.924	87775.876	1772.74	10.91	99.42	5.45
21	37.0 %	Δ	1.465	0.000	0.513	43.611	67206.747	1772.07	11.74	99.36	4.18
22	40.0 %	Δ	1.922	0.000	0.576	43.040	66322.529	1771.99	12.05	99.15	4.12

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar* ² fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.5 %		1.958	48.355	0.258	1.491	556.229	624.38	46.91	49.01	0.79	0.013	0.00
2	4.5 %		0.533	28.039	0.134	4.024	5520.732	1668.98	37.40	97.22	2.13	0.062	0.03
3	6.0 %	Δ	1.043	6.273	0.158	5.480	8082.462	1749.08	31.49	96.33	2.90	0.376	0.91
4	7.5 %	Δ	1.587	1.428	0.148	9.368	14082.507	1770.48	16.31	96.78	4.95	2.821	26.43
5	9.0 %	Δ	2.597	11.121	0.347	16.096	24159.032	1768.74	11.81	96.92	8.51	0.622	0.75
6	10.0 %	Δ	1.646	0.000	0.241	12.155	18413.372	1779.23	12.67	97.43	6.42	4.719	57.64
7	11.0 %	Δ	0.589	7.141	0.281	13.544	20399.638	1772.70	14.69	99.15	7.16	0.816	1.75
8	12.5 %	Δ	0.316	6.465	0.303	15.008	22535.928	1769.23	11.57	99.59	7.93	0.998	2.00
9	14.0 %	Δ	0.239	13.573	0.383	15.917	23956.928	1771.91	12.56	99.70	8.41	0.504	0.45
10	15.5 %	Δ	0.201	3.897	0.296	16.268	24562.349	1775.47	11.46	99.76	8.60	1.795	6.14
11	17.0 %	Δ	0.135	2.463	0.219	10.286	15522.227	1774.82	18.01	99.74	5.44	1.796	9.95
12	19.0 %	Δ	0.255	14.825	0.360	16.095	24238.280	1772.53	13.97	99.69	8.51	0.467	0.40
13	21.0 %	Δ	0.382	0.684	0.266	11.188	16859.408	1773.26	13.53	99.33	5.91	7.037	159.15
14	24.0 %	Δ	0.171	3.236	0.179	10.572	15929.380	1773.11	15.21	99.68	5.59	1.405	5.43
15	27.0 %	Δ	0.256	1.982	0.107	7.401	11151.759	1773.12	20.58	99.32	3.91	1.606	10.29
16	30.0 %	Δ	0.341	0.000	0.138	8.551	12885.688	1773.26	18.72	99.22	4.52	6.084	108.94
17	35.0 %	Δ	0.419	0.000	0.118	6.757	10167.768	1771.61	24.28	98.80	3.57	6.084	108.94
18	40.0 %	Δ	0.265	0.000	0.097	6.097	9156.067	1769.36	22.19	99.15	3.22	6.084	108.94
19	45.0 %	Δ	0.162	5.598	0.067	2.881	4248.879	1749.05	53.92	98.89	1.52	0.221	0.49

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar* ² fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.5 %	Δ	2.492	4.335	0.111	4.154	6175.181	1758.05	59.59	89.34	0.30	0.41	1.29
2	4.5 %	Δ	3.130	1.945	0.241	11.383	17285.207	1781.95	21.54	94.92	0.82	2.52	17.59
3	6.0 %	Δ	6.923	25.289	0.835	47.361	71694.521	1778.41	7.10	97.23	3.43	0.81	0.47
4	7.0 %	Δ	3.997	17.017	0.888	51.135	77089.874	1773.76	5.54	98.49	3.70	1.29	1.04
5	8.0 %	Δ	2.406	20.115	0.890	52.387	78764.111	1770.69	5.44	99.10	3.79	1.12	0.76
6	9.0 %	Δ	7.248	13.033	0.921	51.836	77996.468	1771.57	5.66	97.33	3.75	1.71	1.91
7	10.0 %	Δ	6.444	27.859	0.916	54.254	81429.886	1768.74	5.21	97.71	3.92	0.84	0.44
8	11.0 %	Δ	4.751	14.970	0.998	60.987	91976.552	1774.16	4.97	98.50	4.41	1.75	1.65
9	12.0 %	Δ	4.040	11.766	1.397	80.362	121153.211	1773.77	4.18	99.02	5.81	2.94	3.65
10	13.0 %	Δ	1.996	21.651	1.765	100.883	151897.385	1772.33	3.60	99.61	7.30	2.00	1.36
11	14.0 %	Δ	1.047	17.530	1.684	96.716	145773.508	1773.49	3.88	99.79	7.00	2.37	1.86

12	15.0 %	△	1.239	25.407	2.074	120.861	182071.083	1772.91	3.31	99.80	8.74	2.05	1.08
13	16.0 %	△	1.039	22.552	1.970	115.349	173917.117	1773.87	3.51	99.82	8.34	2.20	1.53
14	17.0 %	△	0.546	10.407	1.622	94.831	142789.283	1772.36	4.03	99.89	6.86	3.92	5.39
15	18.0 %	△	0.968	28.464	2.361	137.359	206554.141	1770.88	4.45	99.86	9.94	2.08	1.00
16	19.5 %	△	0.904	22.731	2.184	128.904	193653.837	1769.80	3.12	99.86	9.32	2.44	1.77
17	21.0 %	△	0.716	5.018	1.341	78.682	118371.161	1771.38	4.11	99.82	5.69	6.74	18.03
18	22.5 %	△	0.788	14.356	0.854	51.160	77188.084	1774.63	5.49	99.70	3.70	1.53	1.63
19	24.0 %	△	0.684	19.330	0.379	23.664	35627.721	1772.22	11.39	99.43	1.71	0.53	0.42
20	25.5 %	△	0.485	0.000	0.385	20.089	30427.319	1779.05	12.80	99.53	1.45	1.96	6.30

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar* ² fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.0 %		1.992	2.589	0.000	0.519	762.366	1745.09	474.27	56.42	0.04	0.09	0.51
2	4.0 %	△	3.306	0.000	0.170	9.341	14207.986	1783.80	21.67	93.57	0.74	0.54	0.99
3	5.0 %	△	4.271	8.166	0.330	16.778	25284.128	1773.30	12.33	95.24	1.33	0.88	1.75
4	6.0 %	△	4.018	6.155	0.690	38.271	57649.221	1772.83	6.02	97.98	3.03	2.67	6.96
5	7.0 %	△	4.548	3.179	0.770	44.089	66483.375	1774.01	5.33	98.02	3.49	5.96	28.56
6	8.0 %	△	5.274	11.554	0.723	42.252	63664.075	1773.14	5.76	97.61	3.34	1.57	2.44
7	9.0 %	△	6.058	17.170	1.093	67.833	102379.022	1775.02	4.15	98.28	5.37	1.70	1.49
8	10.0 %	△	6.390	6.468	1.038	63.329	95632.785	1775.64	4.13	98.06	5.01	4.21	9.01
9	11.0 %	△	4.534	22.329	1.307	78.920	118869.478	1772.72	4.04	98.88	6.24	1.52	1.03
10	12.0 %	△	1.964	9.658	1.262	74.599	112305.739	1772.16	3.97	99.48	5.90	3.32	5.38
11	13.0 %	△	1.815	17.989	1.638	101.964	153550.834	1772.51	3.20	99.65	8.07	2.44	2.01
12	14.0 %	△	1.727	28.618	1.656	97.157	145931.823	1769.58	3.75	99.65	7.69	1.46	0.74
13	15.0 %	△	0.911	18.897	1.542	90.128	135633.697	1771.74	3.42	99.80	7.13	2.05	1.62
14	16.5 %	△	0.764	18.954	1.778	101.883	153346.116	1771.90	3.26	99.85	8.06	2.31	1.88
15	18.0 %	△	0.659	19.608	1.687	96.657	145264.455	1770.23	3.29	99.87	7.65	2.12	1.69
16	19.5 %	△	0.679	13.156	1.681	102.016	153419.048	1770.97	3.31	99.87	8.07	3.33	3.76
17	21.0 %	△	0.562	9.047	1.250	76.829	115561.230	1771.17	3.77	99.86	6.08	3.65	6.06
18	22.5 %	△	0.492	0.000	1.168	70.339	105803.231	1771.21	5.33	99.86	5.57	1.41	0.99
19	24.0 %	△	0.451	9.087	0.882	51.949	78150.329	1771.34	5.51	99.83	4.11	2.46	4.07
20	31.0 %	△	0.444	12.628	0.706	39.024	58607.371	1769.43	8.11	99.78	3.09	1.33	1.79

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar* ² fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.0 %	△	0.967	0.000	0.058	1.269	2118.446	1891.29	142.03	88.12	0.13		
2	4.0 %	△	4.732	5.727	0.311	16.971	25565.408	1772.91	8.60	94.81	1.74	1.27	2.25
3	5.0 %	△	2.311	3.192	0.402	22.465	33847.342	1773.09	7.66	98.02	2.31	3.03	10.25
4	6.0 %	△	4.019	4.907	0.616	33.917	51018.654	1771.22	4.67	97.72	3.48	2.97	5.86
5	7.0 %	△	2.492	0.575	0.747	42.746	64417.968	1773.30	4.19	98.87	4.39	31.97	598.36
6	8.0 %	△	6.180	7.842	1.016	58.561	88144.895	1771.96	2.53	97.97	6.02	3.21	3.22
7	9.0 %	△	4.943	4.377	0.976	60.526	91196.429	1773.12	2.89	98.42	6.22	5.95	15.00
8	10.0 %	△	4.690	13.432	1.432	86.136	129475.023	1770.42	2.02	98.94	8.85	2.76	2.54
9	11.0 %	△	1.751	18.757	1.645	97.033	145865.346	1770.51	2.03	99.65	9.97	2.22	1.17
10	12.0 %	△	0.745	21.129	1.350	78.819	118664.971	1772.22	2.54	99.81	8.10	1.60	0.68
11	13.0 %	△	0.713	19.649	1.711	101.426	152408.572	1770.06	1.84	99.86	10.42	2.22	0.98

12	14.0 %	△	0.529	19.242	1.707	99.412	149567.585	1771.46	1.80	99.89	10.21	2.22	1.24
13	15.0 %	△	0.403	29.280	1.337	81.749	123121.861	1772.64	2.26	99.90	8.40	1.20	0.45
14	16.5 %	△	0.506	17.667	1.250	75.950	114259.407	1771.37	2.50	99.87	7.80	1.85	1.05
15	18.0 %	△	0.356	13.198	0.834	49.450	74319.318	1770.26	3.80	99.86	5.08	1.61	0.97
16	19.5 %	△	0.294	11.522	0.468	29.960	45062.199	1771.13	3.99	99.81	3.08	1.12	0.82
17	21.0 %	△	0.398	0.000	0.178	14.666	22066.817	1771.50	10.30	99.47	1.51	3.04	10.97
18	22.5 %	△	0.274	17.953	0.152	9.640	14490.004	1770.39	15.67	99.44	0.99	0.23	0.17
19	24.0 %	△	0.221	8.316	0.116	8.835	13283.178	1770.67	14.58	99.51	0.91	0.46	0.51
20	26.0 %	△	0.228	7.167	0.073	3.804	5631.775	1753.20	32.48	98.82	0.39	0.23	0.27

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar ^{*2} fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.0 %	△	1.134	2.809	0.000	0.722	1019.283	1700.47	240.79	75.26	0.04	0.11	0.71
2	4.0 %	△	2.781	0.000	0.071	4.993	7547.701	1776.84	32.07	90.18	0.31		
3	5.0 %	△	2.556	7.808	0.537	31.540	47628.253	1775.63	7.32	98.44	1.93	1.74	3.59
4	6.0 %	△	2.787	17.083	0.601	37.613	56498.328	1769.62	5.31	98.56	2.31	0.95	0.94
5	7.0 %	△	1.740	0.000	0.543	28.324	42807.560	1776.59	6.03	98.81	1.74	1.13	1.22
6	8.0 %	△	4.743	4.008	0.435	24.574	37114.576	1775.80	7.24	96.36	1.51	2.64	9.98
7	9.0 %	△	2.222	0.000	0.586	33.473	50396.799	1772.26	6.03	98.71	2.05	15.56	305.72
8	10.0 %	△	2.930	6.089	0.755	45.419	68474.258	1773.77	10.42	98.75	2.78	3.21	8.83
9	11.0 %	△	1.894	14.492	1.030	60.495	91119.913	1772.75	4.26	99.39	3.71	1.79	2.04
10	12.0 %	△	1.899	10.601	1.249	77.190	116389.424	1773.95	4.31	99.52	4.73	3.13	4.70
11	13.0 %	△	3.413	16.423	1.584	91.964	138347.301	1771.34	2.92	99.28	5.64	2.41	2.33
12	14.0 %	△	2.182	25.647	1.648	97.714	147290.793	1773.59	3.37	99.56	5.99	1.64	1.06
13	15.0 %	△	2.147	17.687	1.444	88.833	133385.832	1769.21	3.39	99.53	5.45	2.16	2.16
14	16.5 %	△	1.127	27.093	1.839	108.568	163332.462	1771.38	2.79	99.80	6.66	1.72	1.06
15	18.0 %	△	0.696	24.547	1.876	110.584	166301.568	1770.95	2.93	99.88	6.78	1.94	1.25
16	19.5 %	△	0.471	3.753	1.545	91.984	138404.836	1771.57	2.81	99.90	5.64	10.54	49.09
17	21.0 %	△	0.489	28.857	2.090	127.417	191494.427	1770.24	3.10	99.92	7.81	1.90	1.07
18	22.5 %	△	0.352	30.354	2.625	152.426	229133.438	1770.50	2.69	99.95	9.34	2.16	1.29
19	24.0 %	△	0.281	16.541	2.046	122.633	184192.916	1769.55	2.74	99.95	7.52	3.19	2.97
20	25.5 %	△	0.546	13.757	1.683	101.687	152818.521	1770.19	3.02	99.89	6.23	3.18	4.12
21	27.0 %	△	0.601	10.766	1.095	65.448	98443.996	1771.19	3.79	99.82	4.01	2.61	4.15
22	28.5 %	△	0.459	0.000	0.646	39.536	59530.702	1772.37	4.99	99.77	2.42	2.73	5.99
23	30.0 %	△	0.792	0.613	0.540	29.256	44047.164	1772.24	8.00	99.47	1.79	20.53	549.43
24	33.0 %	△	0.548	5.286	0.287	16.016	24050.055	1769.30	14.25	99.33	0.98	1.30	3.83
25	40.0 %	△	0.742	14.131	0.739	42.734	64133.037	1768.61	5.30	99.66	2.62	1.30	1.49

ZMT04-5-1, Analysed in GIGCAS, September 2023, J value = 0.0011057 ± 0.0000011

Step	Laser power	Step marked ¹	³⁶ Ar _{air} fA	³⁷ Ar _{Ca} fA	³⁸ Ar _{Cl} fA	³⁹ Ar _K fA	⁴⁰ Ar ^{*2} fA	Age (Ma)	± 2s	⁴⁰ Ar(r) (%)	³⁹ Ar(k) (%)	K/Ca	± 2s
1	3.0 %	△	2.088	0.000	0.018	0.883	1325.528	1769.54	201.01	68.23	0.05	0.01	0.01
2	4.0 %	△	3.352	0.000	0.101	3.521	5028.568	1713.16	43.94	83.54	0.20	0.05	0.03
3	5.0 %	△	5.386	6.286	0.275	14.755	22201.117	1771.55	11.99	93.31	0.84	1.01	2.39
4	6.0 %	△	3.437	2.951	0.739	41.689	62579.779	1768.91	4.81	98.40	2.36	6.07	32.15
5	7.0 %	△	4.938	9.778	0.998	58.689	88222.911	1770.49	3.61	98.37	3.32	2.58	4.03
6	8.0 %	△	4.823	13.230	1.188	68.278	102182.020	1765.47	5.67	98.62	3.86	2.22	2.50

7	9.0 %	△	3.415	0.790	1.307	77.335	116340.595	1771.35	4.16	99.14	4.38	42.09	711.32
8	10.0 %	△	5.459	6.897	1.332	74.042	111509.529	1772.59	3.18	98.57	4.19	4.62	10.21
9	11.0 %	△	2.728	3.146	1.247	74.259	111916.346	1773.40	3.12	99.28	4.20	10.15	45.53
10	12.0 %	△	3.167	9.463	1.293	78.258	117869.138	1772.69	3.35	99.21	4.43	3.56	5.34
11	13.0 %	△	3.441	15.238	1.137	67.209	101050.208	1770.71	3.83	99.00	3.80	1.90	1.99
12	14.0 %	△	2.582	15.198	1.079	63.317	95198.613	1770.71	3.27	99.20	3.58	1.79	1.51
13	15.0 %	△	1.646	10.597	1.050	64.348	96968.996	1773.28	3.88	99.50	3.64	2.61	3.84
14	16.0 %	△	1.223	14.478	0.927	56.053	84570.463	1774.63	4.10	99.57	3.17	1.66	1.66
15	17.0 %	△	1.234	18.752	0.955	61.737	92930.023	1772.01	4.07	99.61	3.49	1.42	1.12
16	18.0 %	△	1.067	20.402	1.068	66.109	99538.107	1772.32	4.52	99.68	3.74	1.39	1.00
17	19.0 %	△	0.649	5.677	0.956	59.521	89375.573	1769.25	3.42	99.78	3.37	4.51	12.79
18	20.0 %	△	0.507	1.706	0.896	54.775	82305.615	1770.03	6.67	99.82	3.10	13.81	116.92
19	21.0 %	△	0.361	11.359	0.841	52.139	78523.558	1772.60	4.37	99.86	2.95	1.97	2.53
20	22.0 %	△	0.308	7.957	1.019	59.246	89042.005	1770.26	4.77	99.90	3.35	3.20	5.96
21	23.0 %	△	0.396	7.546	1.115	65.434	98409.364	1771.03	4.30	99.88	3.70	3.73	7.63
22	24.0 %	△	0.327	0.000	0.976	58.398	87816.081	1770.88	4.39	99.89	3.31	0.79	0.47
23	25.0 %	△	0.282	7.650	1.089	63.723	95697.768	1769.40	5.06	99.91	3.61	3.58	8.11
24	26.0 %	△	0.395	3.745	1.283	74.114	111541.711	1771.82	3.69	99.89	4.19	8.51	35.08
25	27.0 %	△	0.314	0.000	0.981	57.319	86284.968	1772.09	3.45	99.89	3.24	0.85	0.53
26	28.0 %	△	0.329	2.245	1.296	73.659	110786.736	1771.11	4.18	99.91	4.17	14.11	95.88
27	29.0 %	△	0.352	18.583	1.356	78.259	117567.202	1769.77	3.97	99.91	4.43	1.81	1.38
28	30.0 %	△	0.187	14.185	0.916	52.651	79225.309	1771.61	5.87	99.93	2.98	1.60	1.46
29	31.0 %	△	0.383	2.602	1.275	74.759	112459.256	1771.28	3.48	99.90	4.23	12.36	65.61
30	32.0 %	△	0.428	10.616	1.203	72.384	109118.954	1773.70	3.69	99.88	4.10	2.93	4.11

Note:

Step marked ¹: The steps marked with "△" were included in the calculation for the plateau ages.

⁴⁰Ar*²: ⁴⁰Ar* was obtained with the modern atmospheric ⁴⁰Ar/³⁶Ar value of 298.56 ($^{40}\text{Ar}^* = ^{40}\text{Ar}_m - 298.56 \times ^{36}\text{Ar}_m$)

Result in red color: The regression result was <0, and force negative intensities (represented in red) to be zero in calculation by ArArCALC 2.5.2.