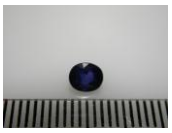
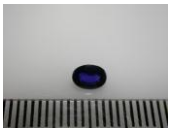
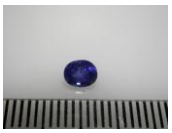
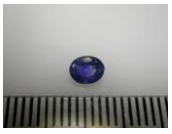
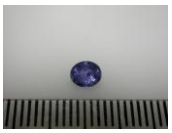
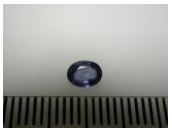
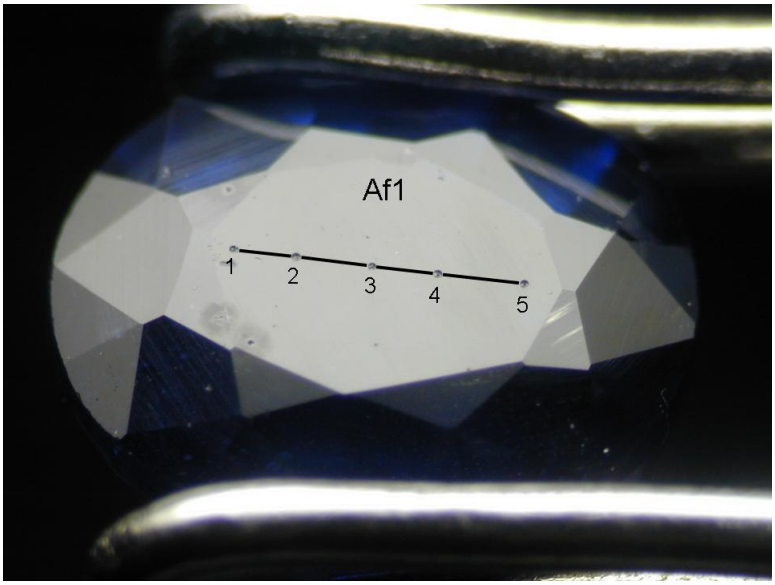
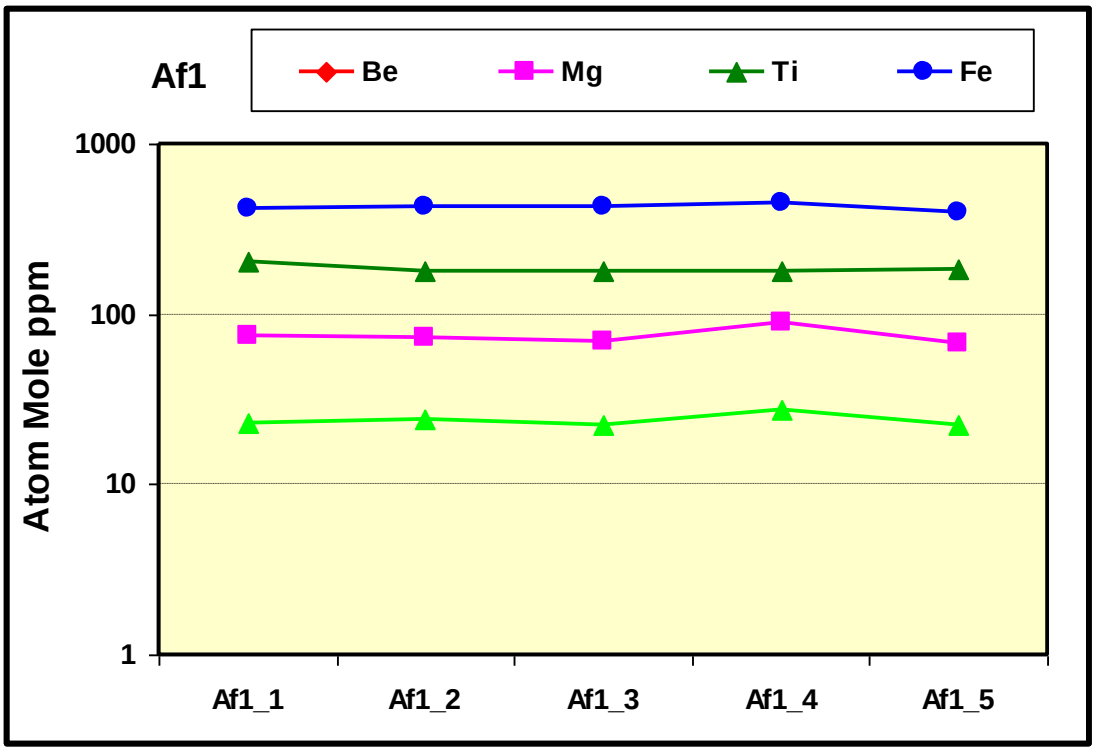
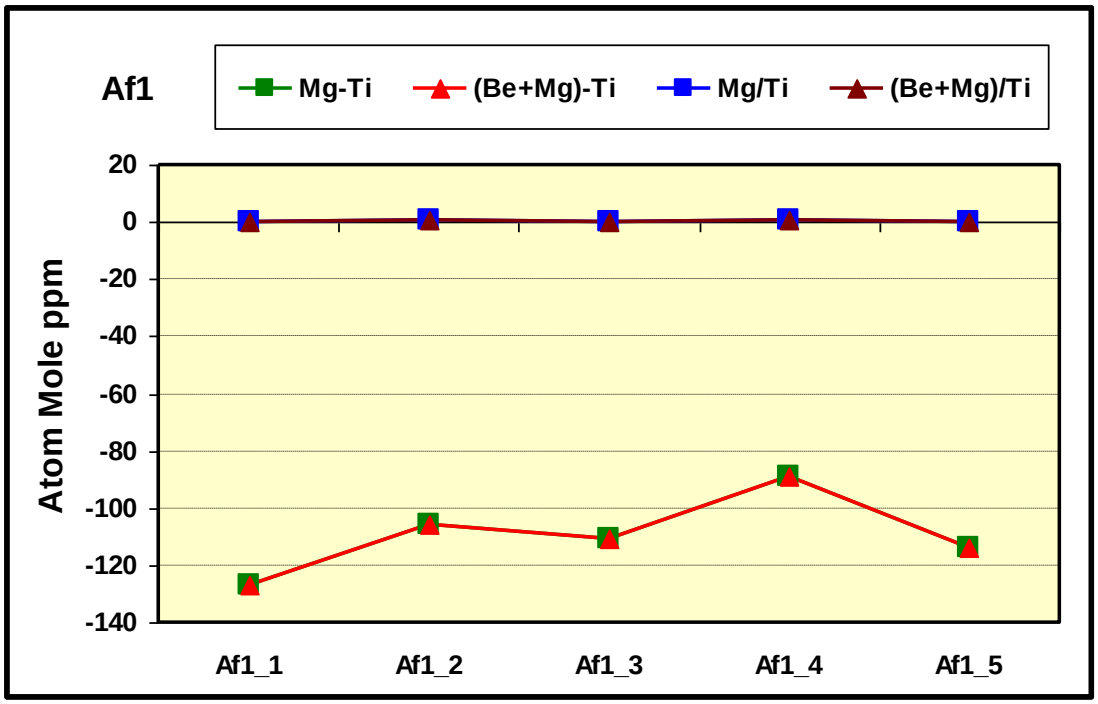
ภาคผนวก ก: ผลวิเคราะห์ธาตุร่องรอยชุดตัวอย่าง _Af

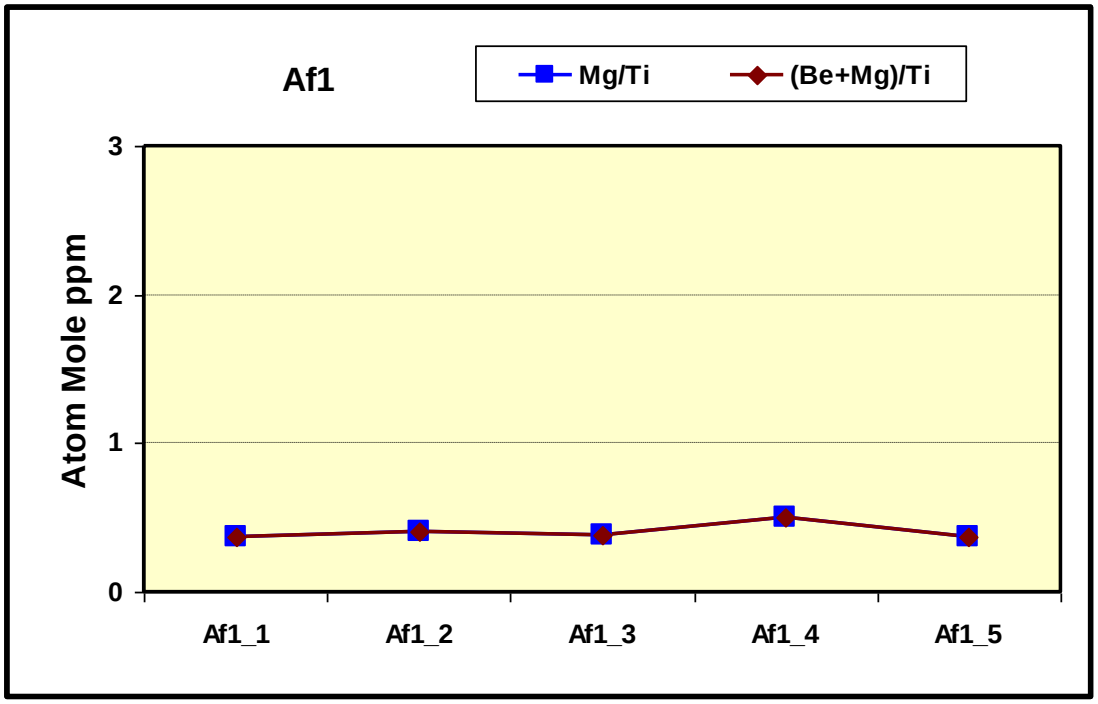
(RI = refractive indices, SG = specific gravity, SWUV = short wave ultraviolet, LWUV = long wave ultraviolet)

Sample no.	Weight (ct)	RI		Colour	SG	Luminescence		Picture
		Min	Max			SW UV	LW UV	
1.af1	0.564	1.762	1.768	Blue	3.987	Inert	Inert	
2.af2	0.472	1.760	1.768	Blue	3.927	Inert	Inert	
3.af3	0.536	1.762	1.770	Blue	4.021	Inert	Inert	
4.af4	0.414	1.760	1.768	Blue	3.932	Inert	Inert	
5.af5	0.450	1.760	1.768	Blue	4.108	Inert	Inert	
6.af6	0.446	1.760	1.768	Blue	4.097	Inert	Inert	

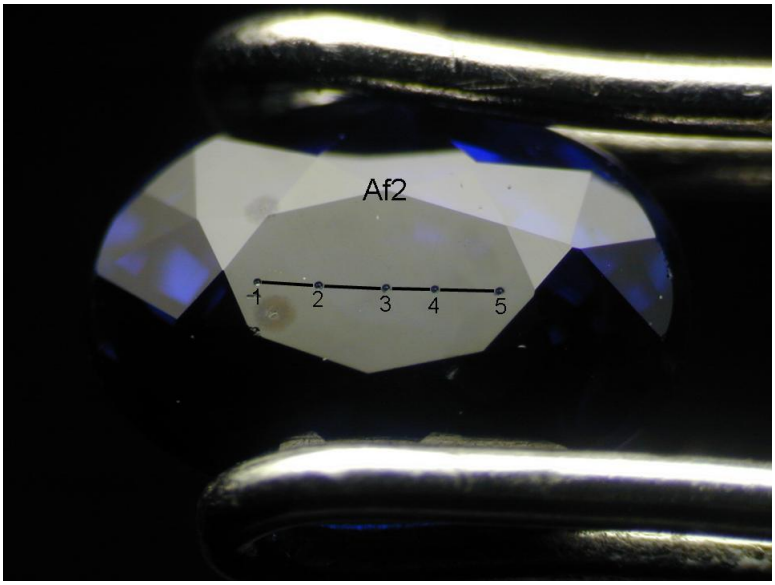

Af1
1
2
3
4
5

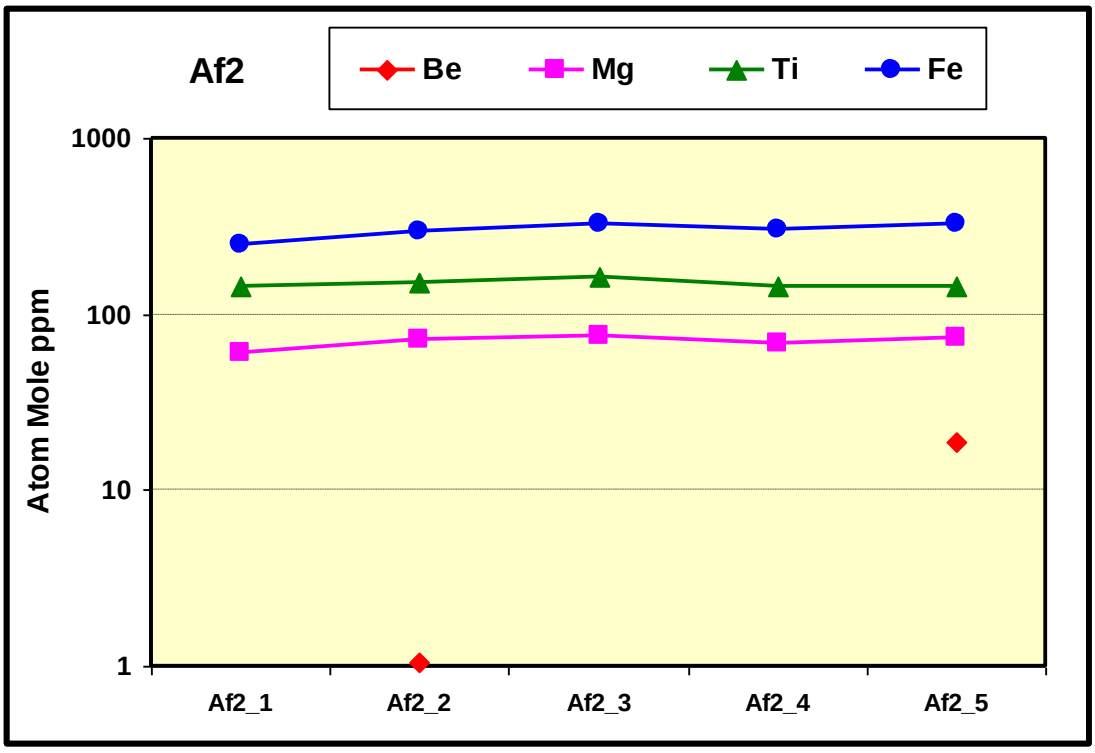

Af1
Be
Mg
Ti
Fe
Atom Mole ppm
1000
100
10
1
Af1_1
Af1_2
Af1_3
Af1_4
Af1_5

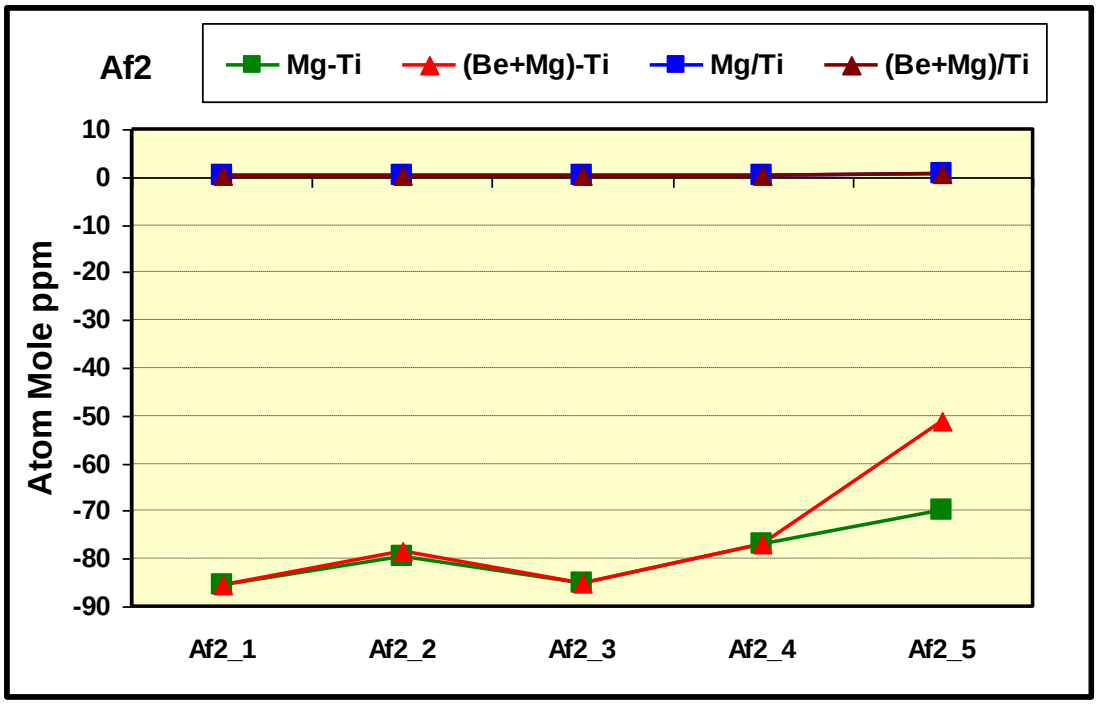

Af1
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
20
0
-20
-40
-60
-80
-100
-120
-140
Af1_1
Af1_2
Af1_3
Af1_4
Af1_5

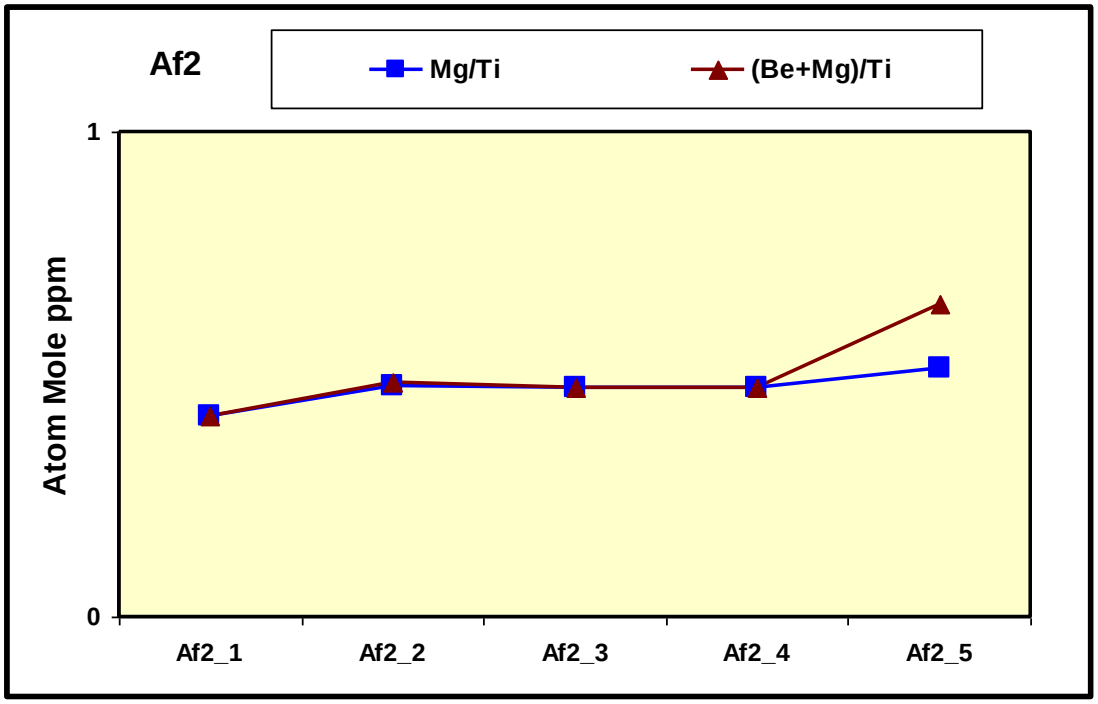

Af1
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
3
2
1
0
Af1_1
Af1_2
Af1_3
Af1_4
Af1_5

Af	Af1_1	Af1_2	Af1_3	Af1_4	Af1_5
Cations (ppm by weight)					
Be	<0.36	<0.34	<0.32	<0.33	<0.39
Na	<6.02	<5.95	<6.55	<5.79	<6.30
Mg	89.64	86.59	82.49	106.24	80.95
Al	529197.38	529197.38	529197.38	529197.38	529197.38
Ti	475.34	419.76	422.80	419.15	426.95
V	57.04	60.06	56.68	68.38	55.26
Cr	325.93	317.10	342.48	727.10	272.87
Mn	<0.29	<0.29	<0.32	<0.29	<0.31
Fe	1150.06	1169.23	1172.44	1226.03	1102.14
Ga	73.68	77.34	78.13	78.79	78.81
Total %	53.09	53.09	53.09	53.14	53.08
Cations (Atom Mole ppm)					
Be	0.00	0.00	0.00	0.00	0.00
Na	0.00	0.00	0.00	0.00	0.00
Mg	75.05	72.50	69.07	88.91	67.78
Al	399132.15	399152.47	399144.64	398951.89	399197.29
Ti	201.93	178.33	179.62	177.98	181.41
V	22.79	23.99	22.64	27.30	22.08
Cr	127.55	124.11	134.04	284.43	106.81
Mn	0.00	0.00	0.00	0.00	0.00
Fe	419.02	426.03	427.19	446.50	401.63
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-126.88**	**-105.83**	**-110.55**	**-89.08**	**-113.62**
Be-Ti	**-201.93**	**-178.33**	**-179.62**	**-177.98**	**-181.41**
(Be+Mg)-Ti	**-126.88**	**-105.83**	**-110.55**	**-89.08**	**-113.62**
(Be+Mg)%	**10.78**	**10.71**	**10.22**	**12.46**	**10.42**
Ti%	**29.01**	**26.35**	**26.58**	**24.95**	**27.87**
Fe%	**60.20**	**62.94**	**63.21**	**62.59**	**61.71**
Mg/Ti	**0.37**	**0.41**	**0.38**	**0.50**	**0.37**
(Be+Mg)/Ti	**0.37**	**0.41**	**0.38**	**0.50**	**0.37**

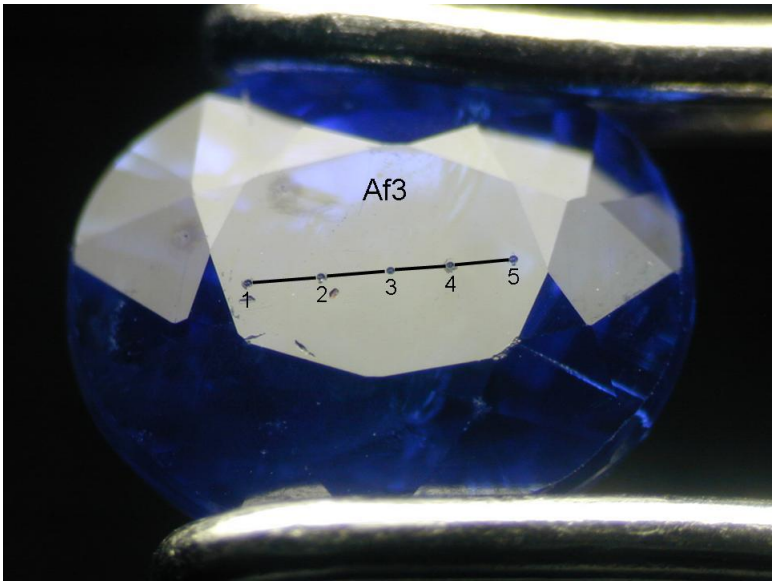

Af2
1
2
3
4
5

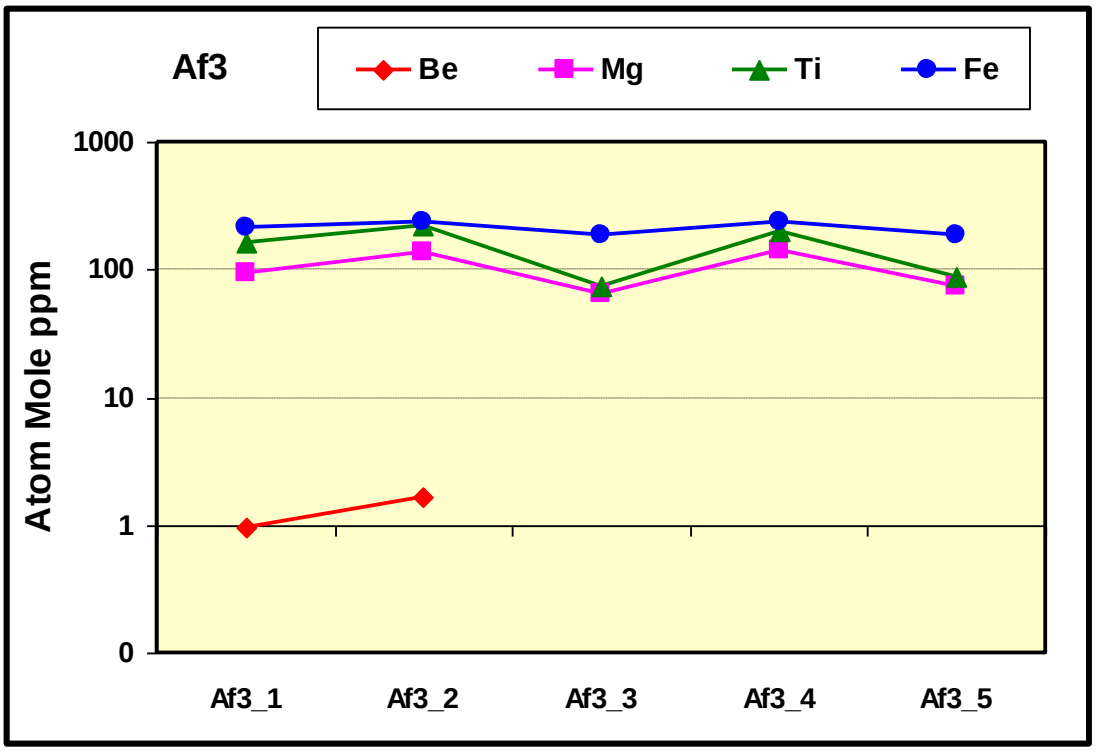

Af2
Be
Mg
Ti
Fe
1000
100
10
1
Atom Mole ppm
Af2_1
Af2_2
Af2_3
Af2_4
Af2_5

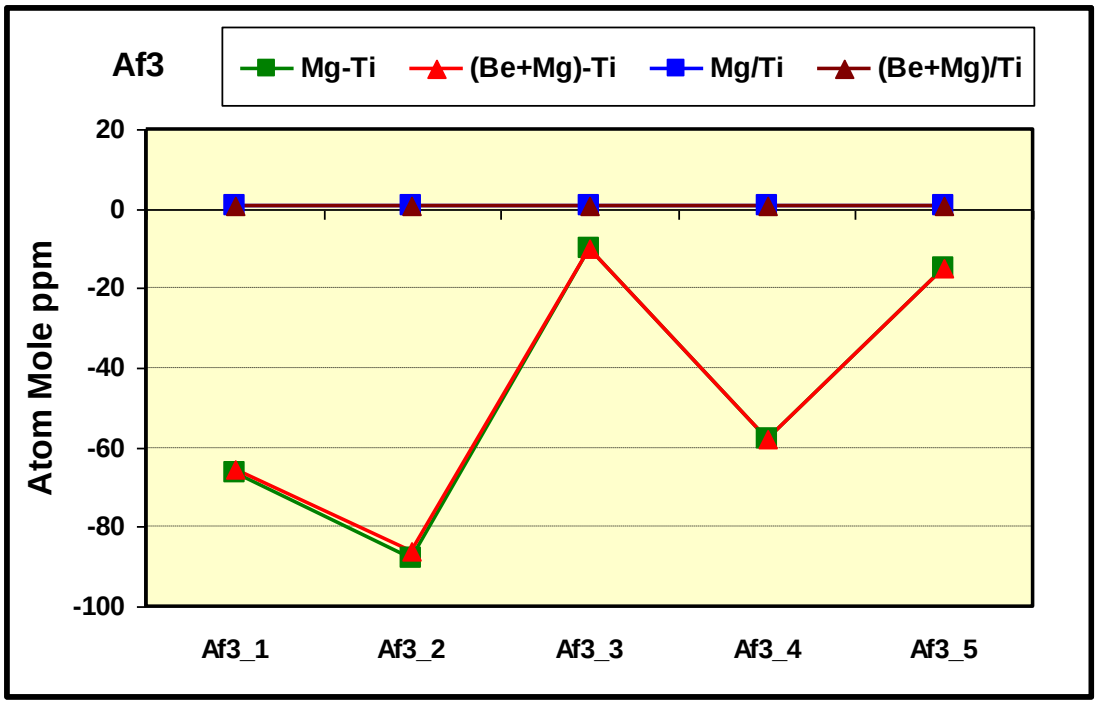

Af2
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Af2_1
Af2_2
Af2_3
Af2_4
Af2_5

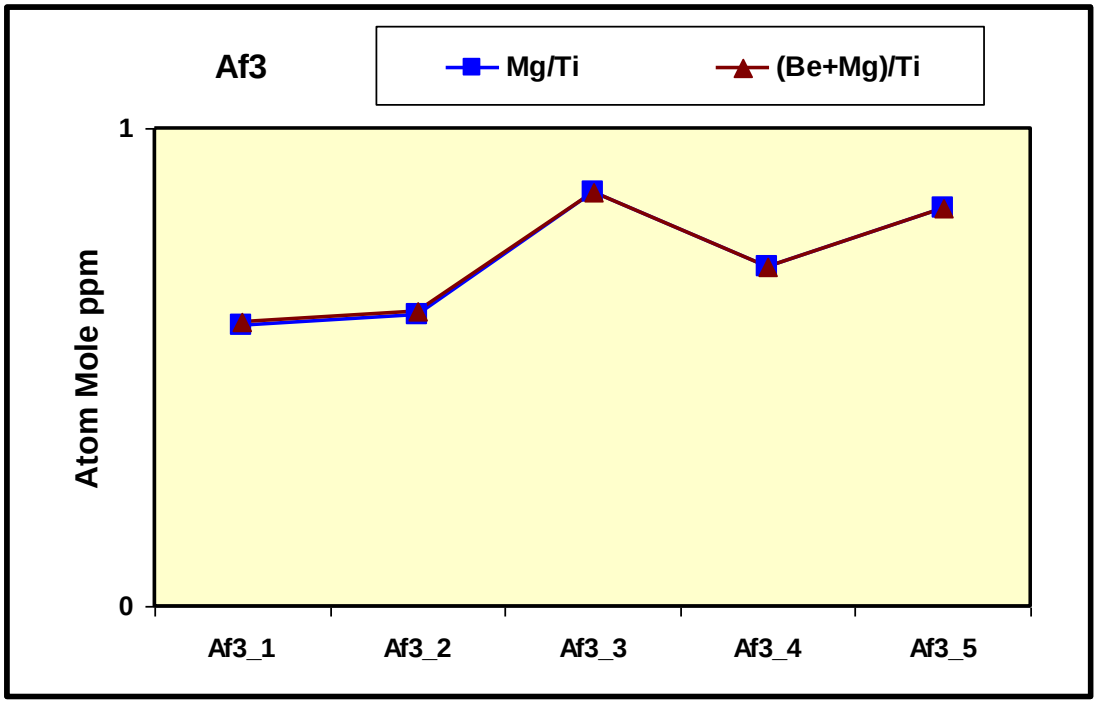

Af2
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
1
0
Af2_1
Af2_2
Af2_3
Af2_4
Af2_5

Af2	Af2_1	Af2_2	Af2_3	Af2_4	Af2_5
Cations (ppm by weight)					
Be	<0.33	0.46	<0.34	<0.31	8.36
Na	<5.67	<5.16	<6.16	<5.27	18.01
Mg	71.88	86.09	90.69	81.79	88.63
Al	529197.38	529197.38	529197.38	529197.38	529197.38
Ti	342.61	356.92	379.04	342.06	339.42
V	66.16	70.72	79.88	78.05	76.66
Cr	<1.32	<1.19	<1.39	<1.25	<1.14
Mn	<0.28	<0.26	<0.31	<0.27	<0.25
Fe	679.56	812.96	890.97	824.79	906.68
Ga	86.17	84.79	96.87	86.57	91.32
Total %	53.02	53.03	53.04	53.03	53.04
Cations (Atom Mole ppm)					
Be	0.00	1.04	0.00	0.00	18.89
Na	0.00	0.00	0.00	0.00	15.95
Mg	60.23	72.13	75.98	68.53	74.25
Al	399494.64	399425.64	399377.86	399428.83	399358.80
Ti	145.68	151.74	161.12	145.42	144.27
V	26.45	28.27	31.93	31.20	30.64
Cr	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.00	0.00	0.00	0.00
Fe	247.82	296.42	324.82	300.73	330.54
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-85.45**	**-79.61**	**-85.15**	**-76.89**	**-70.03**
Be-Ti	**-145.68**	**-150.70**	**-161.12**	**-145.42**	**-125.39**
(Be+Mg)-Ti	**-85.45**	**-78.57**	**-85.15**	**-76.89**	**-51.14**
(Be+Mg)%	**13.28**	**14.04**	**13.52**	**13.31**	**16.40**
Ti%	**32.11**	**29.11**	**28.67**	**28.25**	**25.40**
Fe%	**54.62**	**56.86**	**57.81**	**58.43**	**58.20**
Mg/Ti	**0.41**	**0.48**	**0.47**	**0.47**	**0.51**
(Be+Mg)/Ti	**0.41**	**0.48**	**0.47**	**0.47**	**0.65**

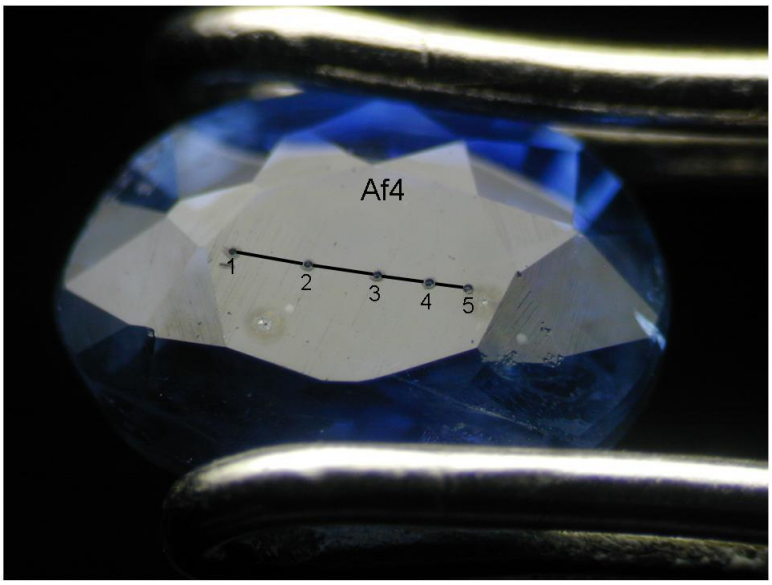

Af3
1
2
3
4
5

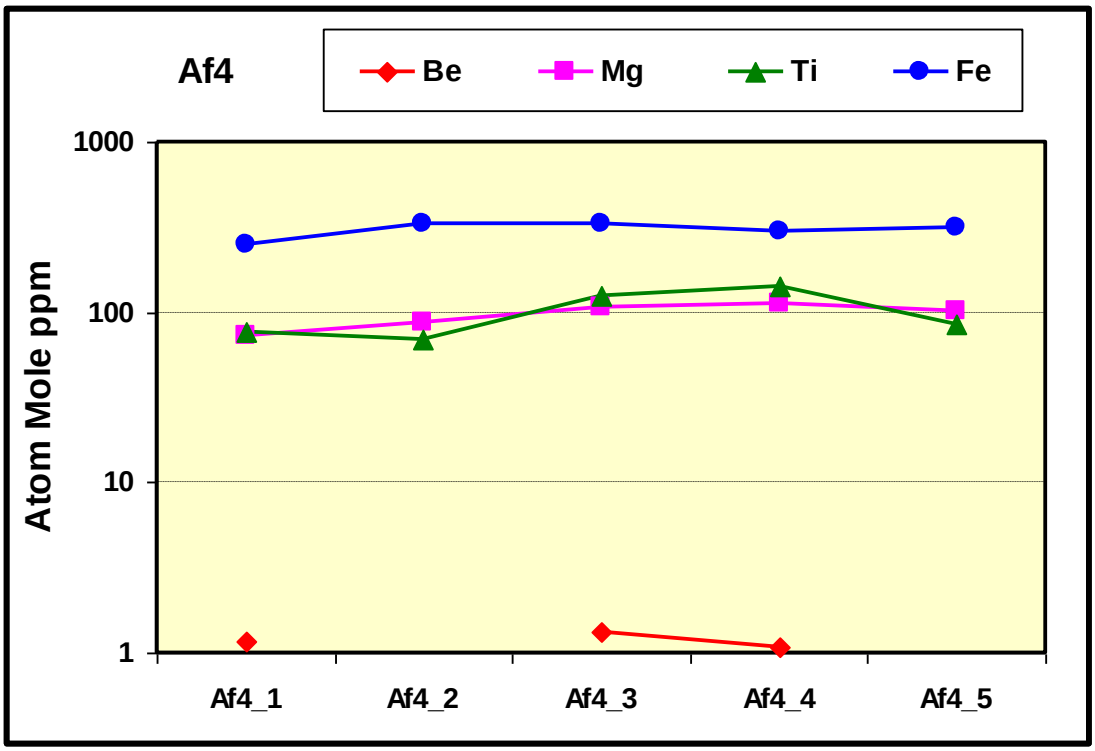

Af3
Be
Mg
Ti
Fe
Atom Mole ppm
1000
100
10
1
0
Af3_1
Af3_2
Af3_3
Af3_4
Af3_5

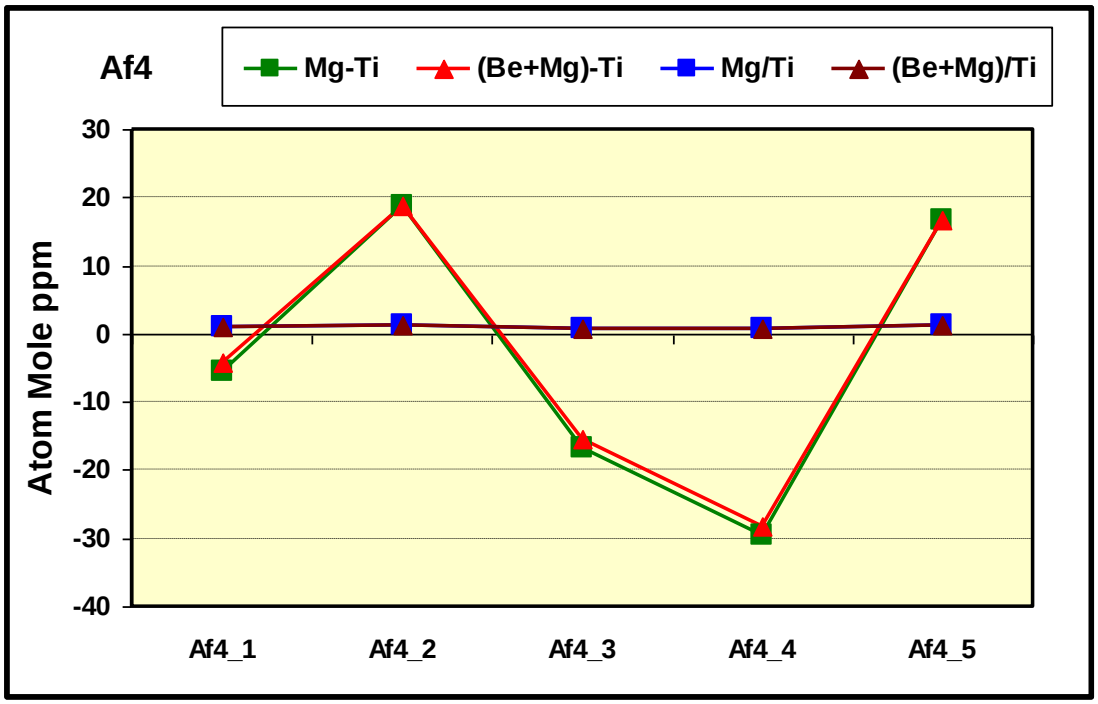

Af3
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
20
0
-20
-40
-60
-80
-100
Af3_1
Af3_2
Af3_3
Af3_4
Af3_5

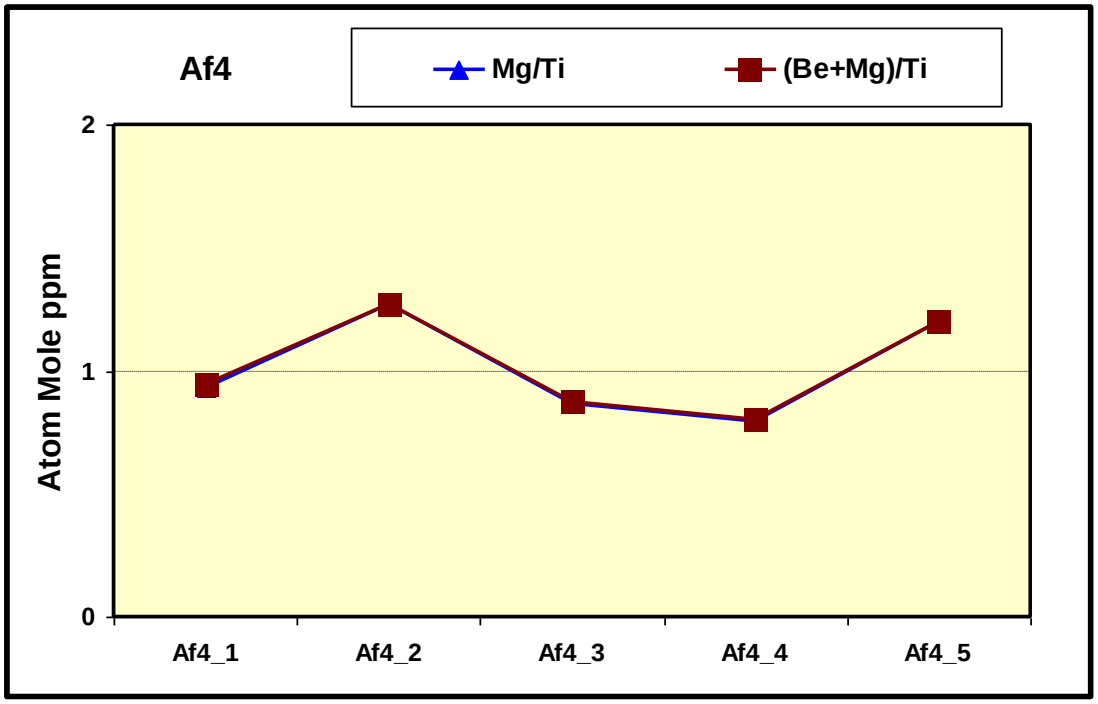

Af3
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
1
0
Af3_1
Af3_2
Af3_3
Af3_4
Af3_5

Af3	Af3_1	Af3_2	Af3_3	Af3_4	Af3_5
Cations (ppm by weight)					
Be	0.43	0.73	<0.36	<0.43	<0.25
Na	<5.97	<6.68	<6.51	<7.11	6.05
Mg	113.47	163.75	76.28	169.60	87.62
Al	529197.31	529197.31	529197.31	529197.38	529197.38
Ti	379.80	529.39	173.57	470.94	207.39
V	2.36	2.81	1.75	2.94	2.09
Cr	<1.49	2.68	<1.72	<1.82	<1.42
Mn	<0.31	<0.34	<0.33	<0.35	<0.28
Fe	595.69	642.12	503.57	641.58	519.66
Ga	92.95	100.43	83.96	104.26	81.02
Total %	53.02	53.04	52.99	53.04	53.00
Cations (Atom Mole ppm)					
Be	0.97	1.65	0.00	0.00	0.00
Na	0.00	0.00	0.00	0.00	5.36
Mg	95.09	137.18	63.95	142.09	73.45
Al	399497.11	399370.54	399653.27	399392.18	399618.90
Ti	161.49	225.03	73.83	200.20	88.21
V	0.94	1.12	0.70	1.18	0.84
Cr	0.00	1.05	0.00	0.00	0.00
Mn	0.00	0.00	0.00	0.00	0.00
Fe	217.24	234.10	183.71	233.91	189.57
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-66.41**	**-87.85**	**-9.88**	**-58.11**	**-14.76**
Be-Ti	**-160.52**	**-223.38**	**-73.83**	**-200.20**	**-88.21**
(Be+Mg)-Ti	**-65.44**	**-86.20**	**-9.88**	**-58.11**	**-14.76**
(Be+Mg)%	**20.23**	**23.22**	**19.89**	**24.66**	**20.91**
Ti%	**34.01**	**37.63**	**22.97**	**34.74**	**25.12**
Fe%	**45.75**	**39.15**	**57.14**	**40.60**	**53.97**
Mg/Ti	**0.59**	**0.61**	**0.87**	**0.71**	**0.83**
(Be+Mg)/Ti	**0.59**	**0.62**	**0.87**	**0.71**	**0.83**

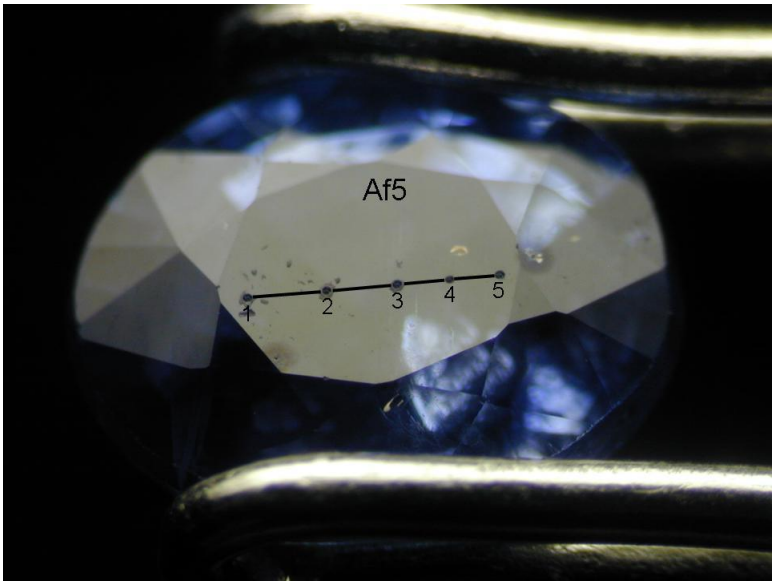

Af4
1
2
3
4
5

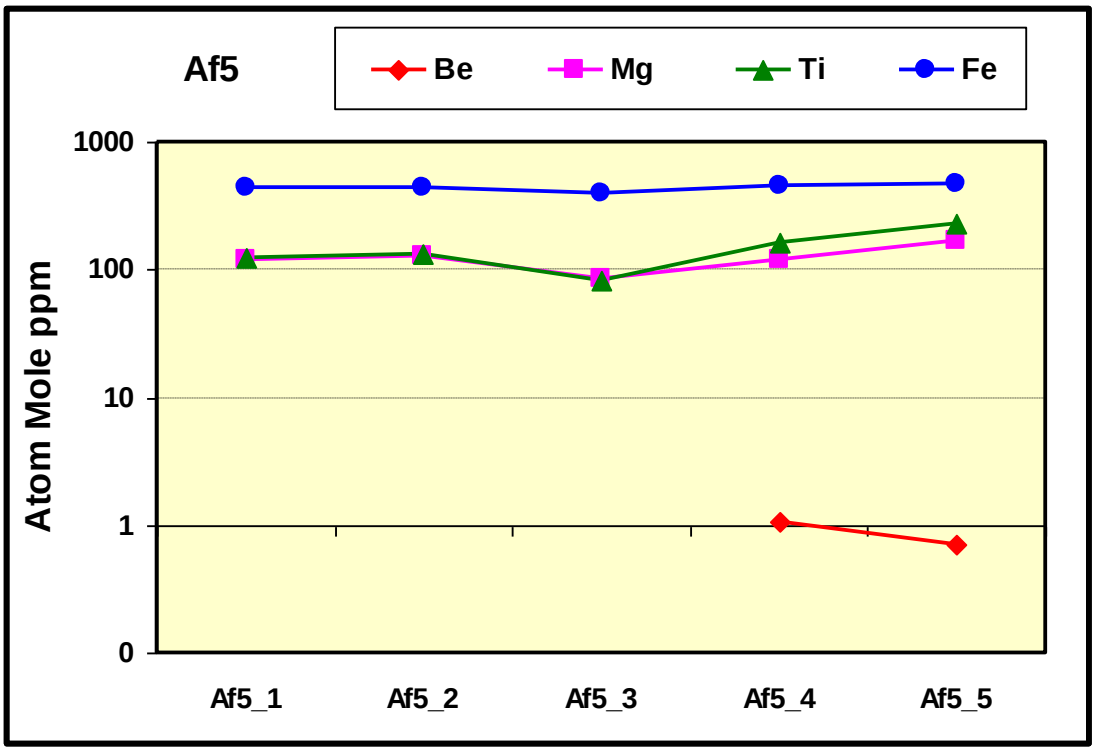

Af4
Be
Mg
Ti
Fe
Atom Mole ppm
1000
100
10
1
Af4_1
Af4_2
Af4_3
Af4_4
Af4_5

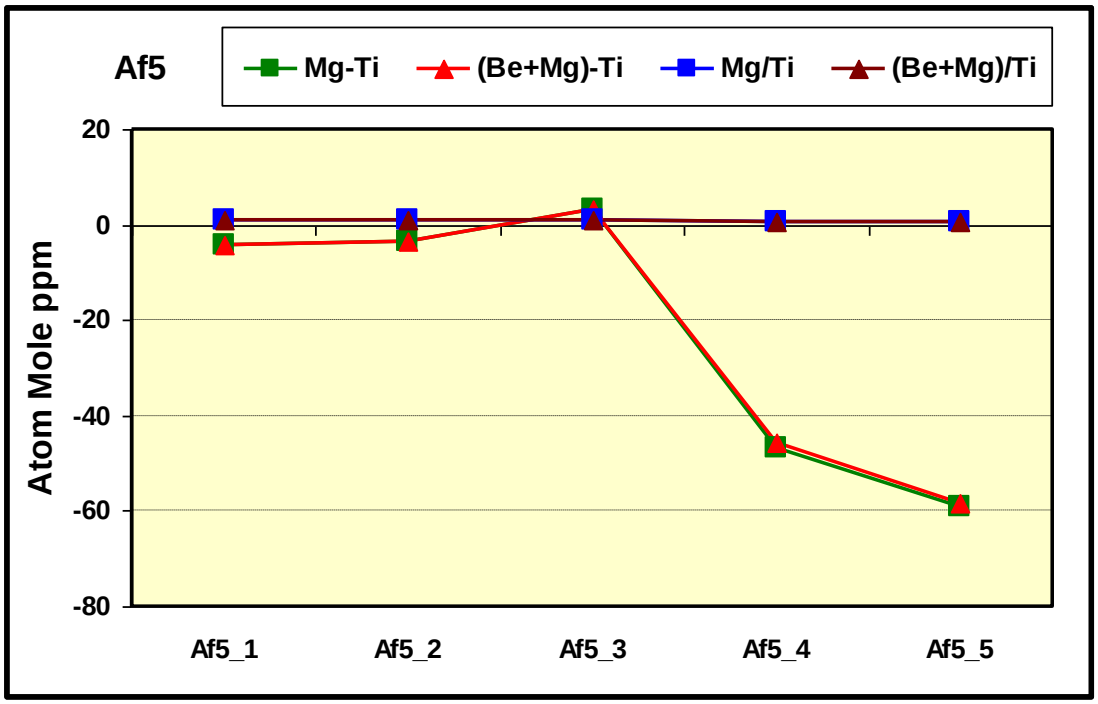

Af4
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
30
20
10
0
-10
-20
-30
-40
Af4_1
Af4_2
Af4_3
Af4_4
Af4_5

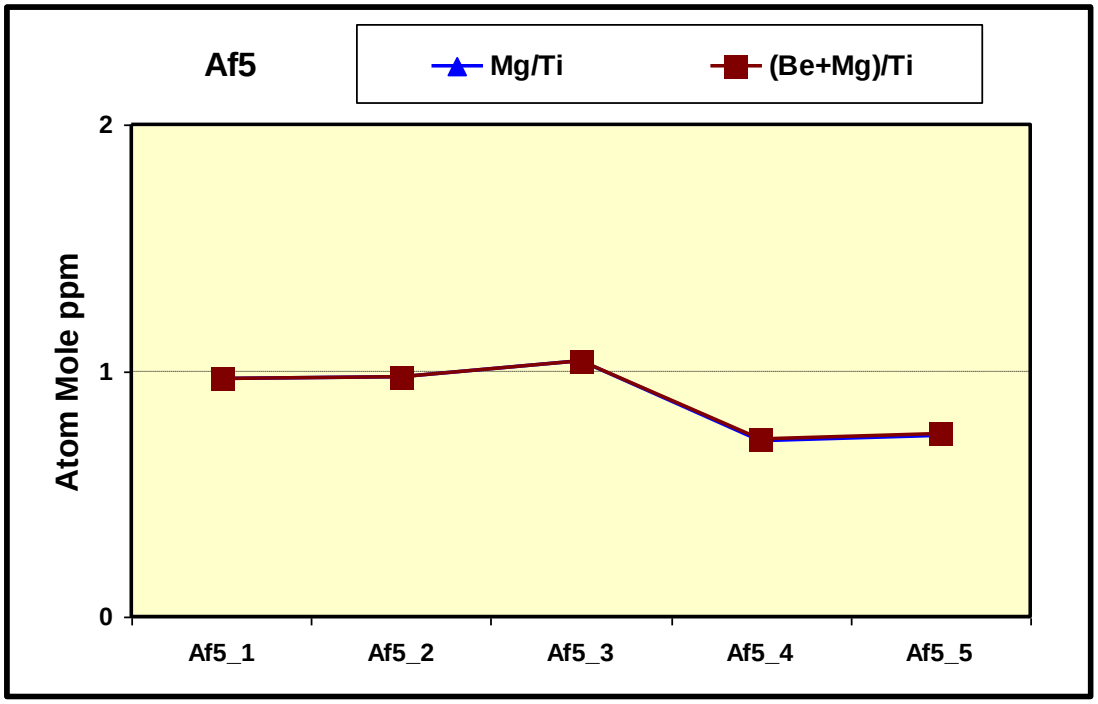

Af4
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
2
1
0
Af4_1
Af4_2
Af4_3
Af4_4
Af4_5

Af4	Af4_1	Af4_2	Af4_3	Af4_4	Af4_5
Cations (ppm by weight)					
Be	0.52	<0.34	0.59	0.48	<0.23
Na	<6.10	<6.01	<6.09	<5.33	<4.30
Mg	85.84	104.37	129.31	136.18	120.36
Al	529197.38	529197.38	529197.38	529197.38	529197.38
Ti	181.87	161.49	294.21	337.60	197.94
V	16.44	21.77	19.33	17.09	19.35
Cr	<1.44	<1.40	<1.46	<1.27	<1.05
Mn	<0.30	<0.30	<0.30	<0.26	<0.205
Fe	688.9	901.58	916.66	811.13	852.8
Ga	52.66	51.12	59.03	52.74	51.18
Total %	53.00	53.02	53.04	53.03	53.02
Cations (Atom Mole ppm)					
Be	1.18	0.00	1.33	1.08	0.00
Na	0.00	0.00	0.00	0.00	0.00
Mg	71.95	87.46	108.34	114.10	100.86
Al	399576.29	399491.45	399406.08	399423.31	399481.30
Ti	77.35	68.67	125.07	143.52	84.16
V	6.57	8.70	7.73	6.83	7.74
Cr	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.00	0.00	0.00	0.00
Fe	251.28	328.79	334.21	295.75	310.99
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-5.40**	**18.79**	**-16.74**	**-29.43**	**16.69**
Be-Ti	**-76.17**	**-68.67**	**-123.74**	**-142.44**	**-84.16**
(Be+Mg)-Ti	**-4.22**	**18.79**	**-15.40**	**-28.34**	**16.69**
(Be+Mg)%	**18.20**	**18.04**	**19.28**	**20.77**	**20.33**
Ti%	**19.25**	**14.16**	**21.98**	**25.89**	**16.97**
Fe%	**62.55**	**67.80**	**58.74**	**53.34**	**62.70**
Mg/Ti	**0.93**	**1.27**	**0.87**	**0.79**	**1.20**
(Be+Mg)/Ti	**0.95**	**1.27**	**0.88**	**0.80**	**1.20**

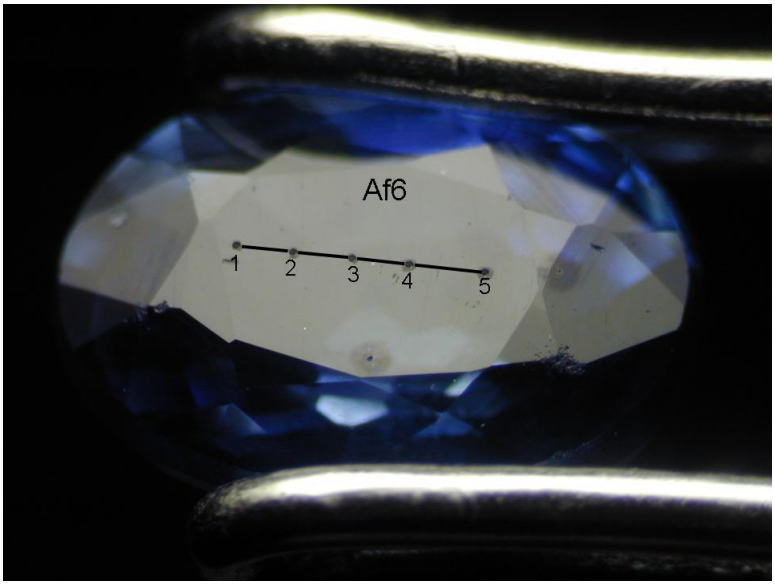

Af5
1
2
3
4
5

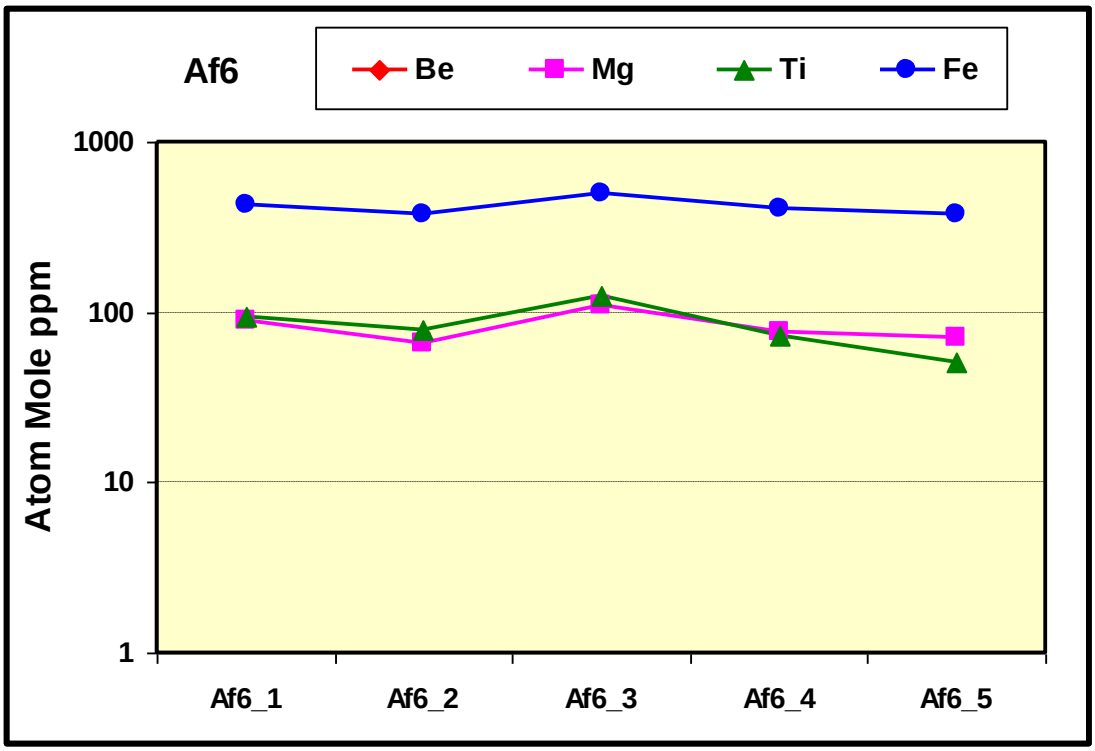

Af5
Be
Mg
Ti
Fe
Atom Mole ppm
1000
100
10
1
0
Af5_1
Af5_2
Af5_3
Af5_4
Af5_5

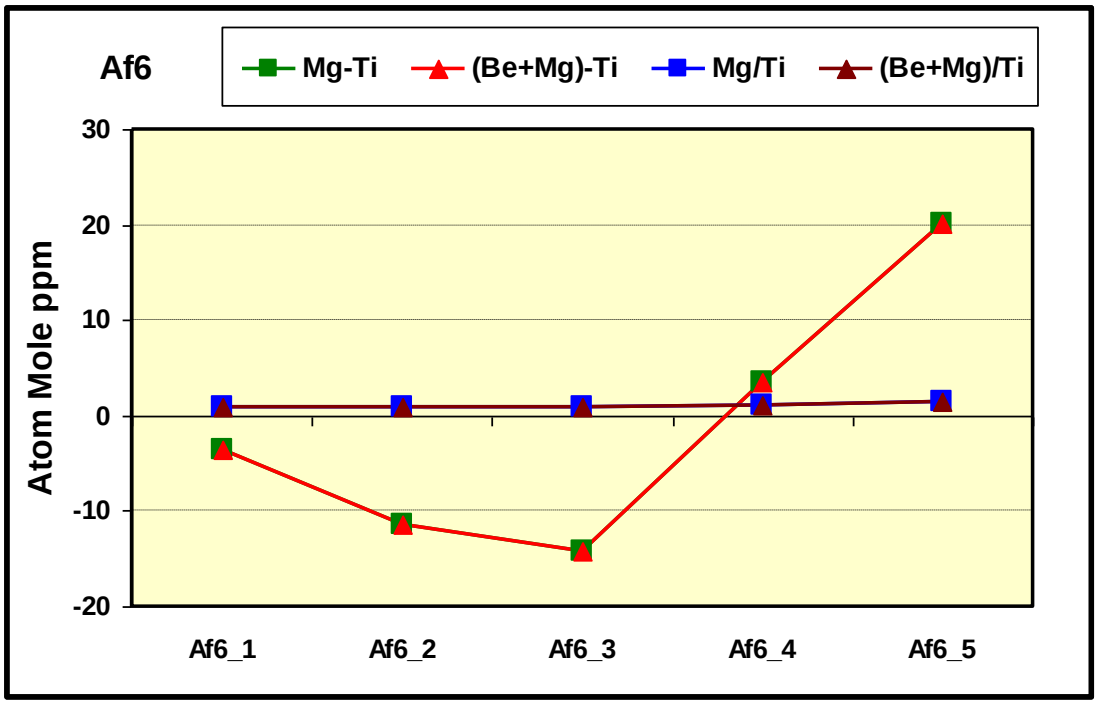

Af5
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
20
0
-20
-40
-60
-80
Af5_1
Af5_2
Af5_3
Af5_4
Af5_5

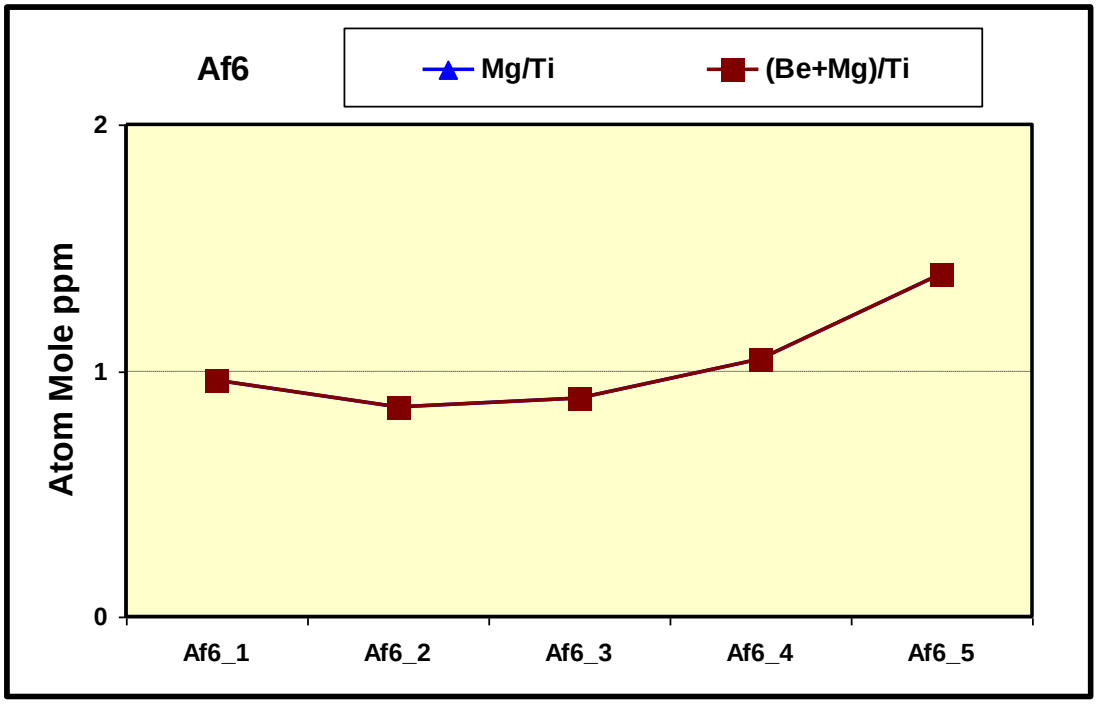

Af5
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
2
1
0
Af5_1
Af5_2
Af5_3
Af5_4
Af5_5

Af5	Af5_1	Af5_2	Af5_3	Af5_4	Af5_5
Cations (ppm by weight)					
Be	<0.46	<0.33	<0.35	0.47	0.31
Na	<5.87	41.68	12.28	<6.10	9.43
Mg	141.99	151.62	102.42	140.51	199.11
Al	529197.50	529197.50	529197.50	529197.50	529197.50
Ti	289.55	306.96	194.43	387.15	531.38
V	18.60	17.87	16.32	18.69	19.82
Cr	35.19	44.45	44.84	31.35	15.60
Mn	<0.27	<0.31	<0.29	<0.29	0.24
Fe	1205.05	1204.12	1092.64	1235.51	1314.13
Ga	104.09	112.61	99.10	106.30	106.01
Total %	53.07	53.08	53.05	53.08	53.11
Cations (Atom Mole ppm)					
Be	0.00	0.00	0.00	1.06	0.70
Na	0.00	36.90	10.88	0.00	8.35
Mg	118.92	126.97	85.80	117.66	166.68
Al	399267.23	399209.49	399369.32	399215.75	399074.79
Ti	123.05	130.43	82.65	164.50	225.71
V	7.43	7.14	6.52	7.47	7.92
Cr	13.78	17.40	17.56	12.27	6.10
Mn	0.00	0.00	0.00	0.00	0.09
Fe	439.21	438.81	398.34	450.25	478.73
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-4.13**	**-3.46**	**3.15**	**-46.84**	**-59.03**
Be-Ti	**-123.05**	**-130.43**	**-82.65**	**-163.44**	**-225.01**
(Be+Mg)-Ti	**-4.13**	**-3.46**	**3.15**	**-45.78**	**-58.33**
(Be+Mg)%	**17.46**	**18.24**	**15.14**	**16.19**	**19.20**
Ti%	**18.06**	**18.73**	**14.58**	**22.43**	**25.89**
Fe%	**64.48**	**63.03**	**70.28**	**61.39**	**54.91**
Mg/Ti	**0.97**	**0.97**	**1.04**	**0.72**	**0.74**
(Be+Mg)/Ti	**0.97**	**0.97**	**1.04**	**0.72**	**0.74**


Af6
1
2
3
4
5


Af6
Be
Mg
Ti
Fe
Atom Mole ppm
1000
100
10
1
Af6_1
Af6_2
Af6_3
Af6_4
Af6_5


Af6
Mg-Ti
(Be+Mg)-Ti
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
30
20
10
0
-10
-20
Af6_1
Af6_2
Af6_3
Af6_4
Af6_5


Af6
Mg/Ti
(Be+Mg)/Ti
Atom Mole ppm
2
1
0
Af6_1
Af6_2
Af6_3
Af6_4
Af6_5

Af6	Af6_1	Af6_2	Af6_3	Af6_4	Af6_5
Cations (ppm by weight)					
Be	<0.41	<0.37	<0.49	<0.38	<0.56
Na	<6.19	<6.52	19.05	<7.21	9.14
Mg	107.52	79.40	130.28	91.88	85.05
Al	529197.50	529197.44	529197.50	529197.44	529197.44
Ti	220.16	183.55	290.26	172.82	120.38
V	6.51	5.94	8.24	6.40	5.16
Cr	<1.38	<1.50	<1.53	<1.68	<1.85
Mn	<0.29	<0.30	<0.33	<0.33	<0.37
Fe	1184.51	1023.49	1362.98	1107.63	1032.97
Ga	19.71	19.21	21.42	19.17	18.77
Total %	53.04	53.02	53.07	53.03	53.02
Cations (Atom Mole ppm)					
Be	0.00	0.00	0.00	0.00	0.00
Na	0.00	0.00	16.87	0.00	8.10
Mg	90.07	66.53	109.11	76.98	71.27
Al	399376.14	399474.21	399244.40	399437.51	399485.21
Ti	93.59	78.04	123.34	73.47	51.19
V	2.60	2.37	3.29	2.56	2.06
Cr	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.00	0.00	0.00	0.00
Fe	431.84	373.23	496.74	403.87	376.69
Ga	37.66	40.52	35.73	37.37	37.19
Total (Atom Mole %)	40.00	40.00	40.00	40.00	40.00
Mg-Ti	**-3.51**	**-11.51**	**-14.24**	**3.51**	**20.08**
Be-Ti	**-93.59**	**-78.04**	**-123.34**	**-73.47**	**-51.19**
(Be+Mg)-Ti	**-3.51**	**-11.51**	**-14.24**	**3.51**	**20.08**
(Be+Mg)%	**14.63**	**12.85**	**14.96**	**13.89**	**14.28**
Ti%	**15.20**	**15.07**	**16.92**	**13.25**	**10.25**
Fe%	**70.16**	**72.08**	**68.12**	**72.86**	**75.47**
Mg/Ti	**0.96**	**0.85**	**0.88**	**1.05**	**1.39**