

**Table A1**

EPMA average major and trace element analyses for monazite

Sample	Grain	Interpretation	Domain	FeO	CaO	SiO2	SrO	P2O5	As2O3	ThO2	UO2	Y2O3	La2O3	Ce2O3	Nd2O3	Pr2O3	Sm2O3
AD-12	bm1	detrital	core	n.m.	1.00	0.47	0.00	29.20	0.03	4.77	0.06	3.62	12.25	27.85	12.48	2.93	1.09
AD-12	bm1	detrital	rim	n.m.	0.63	0.84	0.00	28.10	0.09	5.22	0.03	1.57	13.32	30.08	13.29	3.13	0.86
AD-12	bm9	detrital	core	n.m.	0.39	0.20	0.09	29.84	0.05	1.00	b.d.l.	0.29	16.85	32.99	12.94	3.22	0.95
AD-12	am1	detrital	core	n.m.	1.38	0.21	0.00	29.58	0.06	5.75	0.63	2.37	12.57	27.06	11.40	2.84	1.22
AD-12	bm7	detrital	core	n.m.	0.29	0.07	b.d.l.	29.93	0.01	0.33	0.24	0.94	15.36	32.31	13.80	3.29	1.22
AD-12	cm11	detrital	core	n.m.	0.38	0.52	0.00	29.27	0.05	3.01	0.01	1.59	15.25	30.81	12.29	3.09	0.92
AD-12	bm8	detrital	core	n.m.	0.41	0.44	0.05	29.39	0.09	3.11	0.01	0.60	12.69	35.92	11.48	2.69	1.06
AD-12	am7	detrital	core	n.m.	1.36	0.19	0.00	29.99	0.94	5.50	0.75	3.09	11.85	25.21	12.37	2.99	1.40
AD-12	cm1	detrital	core	n.m.	2.32	0.47	0.01	26.50	0.34	7.60	0.19	2.50	12.59	27.85	12.64	2.99	1.36
AD-12	am2	detrital	core	n.m.	1.29	1.16	0.78	27.83	0.10	9.57	b.d.l.	0.25	13.62	28.35	10.16	2.77	0.40
AD-12	am3	detrital	core	n.m.	0.83	0.33	0.01	29.95	0.20	4.33	0.06	1.35	15.16	29.50	12.23	2.95	0.79
AD-12	am4	authigenic	core	n.m.	0.82	0.46	0.34	28.03	0.23	4.38	0.01	0.40	14.83	29.16	13.25	3.16	1.44
AD-12	cm11	authigenic	rim	n.m.	1.04	0.30	0.87	28.32	0.03	1.49	0.01	0.33	12.66	30.78	15.08	3.43	1.41
AD-12	cm6	authigenic	whole	n.m.	0.73	0.61	0.04	28.73	0.00	0.71	b.d.l.	0.31	15.95	33.06	13.00	3.32	0.70
AD-12	bm1	authigenic	rim	n.m.	0.55	3.16	0.21	28.36	0.00	1.37	b.d.l.	0.31	15.94	29.47	12.32	2.85	1.24
AD-12	am3	authigenic	rim	n.m.	0.40	0.27	0.18	28.64	b.d.l.	0.98	b.d.l.	0.29	16.44	30.85	13.26	3.11	1.56
AD-12	bm8	authigenic	rim	n.m.	0.80	0.43	0.82	29.09	0.01	1.37	b.d.l.	0.23	19.49	30.50	10.31	2.58	0.95
AD-12	am4	authigenic	rim	0.47	0.66	0.17	n.m.	28.96	0.07	0.95	b.d.l.	0.32	16.15	33.38	11.32	3.13	1.13
AD-12	cm1	authigenic	rim	n.m.	0.78	0.43	0.34	29.18	b.d.l.	1.34	b.d.l.	0.24	17.80	30.65	12.31	2.90	1.23
AD-05	m1	detrital	core	0.04	1.68	0.24	n.m.	29.54	0.14	5.30	0.56	3.08	13.06	26.85	11.17	2.79	0.90
AD-05	m2	detrital	core	0.19	0.24	1.23	n.m.	28.15	0.05	4.64	0.05	0.25	11.95	34.24	12.53	3.69	0.62
AD-05	m1	authigenic	rim1	0.16	0.30	0.04	n.m.	29.69	0.08	0.56	0.01	0.53	5.09	26.49	24.25	4.90	2.33
AD-05	m1	authigenic	rim2	0.14	0.82	0.12	n.m.	29.43	0.08	3.40	b.d.l.	0.40	5.58	27.28	22.48	4.78	1.36
AD-05	m1	authigenic	rim3	0.20	0.48	0.07	n.m.	29.54	0.05	1.12	0.00	0.56	8.26	32.82	18.73	4.58	0.57

**Table A1 continued**

EPMA average major and trace element analyses for monazite

Tb2O3	Gd2O3	Dy2O3	Ho2O3	Er2O3	Eu2O3	Tm2O3	Yb2O3	SO2	PbO	Total	n
0.10	1.70	0.56	0.07	0.25	0.64	0.27	0.07	0.09	0.36	99.87	4
0.01	1.21	0.08	0.07	0.09	0.67	0.21	0.05	0.14	0.38	100.07	3
b.d.l.	0.96	b.d.l.	0.02	b.d.l.	0.99	0.18	0.01	0.12	0.07	101.16	6
0.09	1.64	0.20	0.09	0.01	0.75	0.20	0.01	0.02	0.44	98.52	5
0.01	1.25	b.d.l.	0.02	0.01	1.00	0.21	b.d.l.	0.01	0.07	100.37	4
0.02	1.29	0.11	0.02	0.03	0.65	0.19	0.01	0.02	0.14	99.69	7
0.00	1.22	b.d.l.	0.01	b.d.l.	0.93	0.21	0.01	0.06	0.14	100.52	6
0.09	1.84	0.01	0.10	0.11	0.69	0.20	0.06	0.02	0.36	99.11	9
0.08	1.81	0.06	0.10	0.08	0.61	0.23	0.05	0.02	0.37	100.77	4
b.d.l.	0.36	b.d.l.	0.03	b.d.l.	0.72	0.06	0.00	0.03	0.36	97.84	4
0.00	1.22	b.d.l.	0.06	0.01	0.71	0.14	0.01	0.03	0.15	100.01	7
0.00	1.28	b.d.l.	0.01	b.d.l.	1.07	0.19	0.01	0.18	0.13	99.37	7
b.d.l.	1.17	b.d.l.	0.03	b.d.l.	1.02	0.16	0.01	1.03	0.04	99.19	5
b.d.l.	0.82	b.d.l.	b.d.l.	b.d.l.	0.94	0.16	0.00	0.05	0.02	99.17	4
b.d.l.	1.11	b.d.l.	0.02	b.d.l.	0.86	0.17	0.01	0.26	0.04	98.27	3
b.d.l.	1.04	b.d.l.	0.07	b.d.l.	1.00	0.21	b.d.l.	0.19	0.02	98.51	1
b.d.l.	0.92	b.d.l.	0.01	b.d.l.	0.77	0.10	b.d.l.	0.96	0.03	99.38	3
b.d.l.	1.24	b.d.l.	b.d.l.	b.d.l.	0.96	0.18	b.d.l.	0.74	0.02	99.86	1
0.00	1.08	b.d.l.	b.d.l.	b.d.l.	0.87	0.17	b.d.l.	0.39	0.03	99.73	1
0.03	1.34	0.51	0.05	0.26	0.70	0.19	0.13	0.65	0.51	99.71	6
b.d.l.	0.64	b.d.l.	b.d.l.	b.d.l.	0.77	0.17	b.d.l.	0.02	0.34	99.76	3
0.01	2.01	b.d.l.	0.01	0.01	1.68	0.39	b.d.l.	0.13	0.01	98.69	3
b.d.l.	1.37	b.d.l.	0.02	0.01	1.43	0.29	0.01	0.15	0.07	99.22	6
0.01	1.03	b.d.l.	0.04	b.d.l.	1.23	0.18	0.02	0.15	0.03	99.67	6