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ศูนย์วิทยทรัพยากร
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APPENDICES

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Appendix A Physical properties of Songea corundums.

Sample	Carats	GIA Color	SG.	RI.		Birefringence	Luminescence		Inclusion	Comment
				Max.	Min.		LW	SW		
Sga1	0.4470	RO/OR3/2	3.947	1.774	1.765	0.009	mo. Pink	inert	crack, iron stain, rutile needles	
Sga2	0.4505	RO/OR3/2	3.939	1.776	1.768	0.008	mo. Pink	inert	crack, iron stain, rutile needles	
Sga3	0.4710	yO2/3	3.919	1.773	1.765	0.008	w. Orange	inert	crack, iron stain	
Sga4	0.5100	rO4/3, oY2/3	3.936	1.780	1.772	0.008	w. Orange	inert	1 rutile prism	
Sga5	0.5295	R7/3	4.025	1.775	1.769	0.006	mo. Red	inert	2 black rutiles, unk tp	
Sga6	0.4960	rim R2/2, core B3/1	3.994	1.772	1.764	0.008	mo. Pink	inert	2 black 1 orange rutiles	
Sga7	0.5935	vl.P3/1	3.698	1.775	1.768	0.007	w. Red	inert	1 black rutile, 5 unk	
Sga8	0.5445	rim l.V8/1 core Y2/2	4.015	1.772	1.763	0.009	w. Red	inert	dark brownish rutile	
Sga9	0.5130	V3/2	3.977	1.772	1.766	0.006	w. Red	inert	unk tp	
Sga10	0.5420	l.oY2/3	4.042	1.774	1.768	0.006	inert	inert	unk tp	
Sga11	0.5840	vl.oY2/3	3.985	1.775	1.768	0.007	inert	inert	dark brownish epidote	
Sga12	0.6390	rim O5/2 core C(W)	4.150	1.772	1.764	0.008	w. Orange	inert	crack, iron stain	
Sga13	0.5030	l.oY2/3, V3/2	4.041	1.772	1.764	0.008	inert	inert	2 unk brownish crystals, rutile needles	
Sga14	0.5170	l.bP6/3	3.922	1.777	1.768	0.009	w. Red	inert	hexagonal brownish orange rutile needles	
Sga15	0.5200	PR/RP2/1	3.902	1.768	1.776	0.008	w. Red	inert		
Sga16	0.2340	C(W)?	3.978	1.779	1.771	0.008	inert	inert		
Sga17	0.2585	l.YG/GY2/1	4.076	1.772	1.763	0.009	inert	inert	1 epidote, 1 brown rutile	
Sga18	0.2580	YG/GY2/1	3.985	1.774	1.765	0.009	inert	inert	4 orange rutiles	
Sga19	0.2760	l.Y2/2	4.063	1.778	1.769	0.009	inert	inert	3 orange rutiles	
Sga20	0.2535	l.YG/GY2/1	3.924	1.771	1.763	0.008	inert	inert	brown&orange rutiles	
Sgb21	0.4855	RO/OR6/3	3.375	1.772	1.764	0.008	mo. Pink	inert	2 orange rutiles	
Sgb22	0.3475	O6/3	4.307	1.776	1.768	0.008	mo. Pink	inert	2 small oval crystal	
Sgb23	0.3630	RO/OR3/4	3.980	0.774	1.765	0.009	mo. Pink	inert	1 larged black rutile	
Sgb24	0.5945	rim O5/2 core yO3/3	4.035	1.774	1.765	0.009	mo. Pink	inert	iron stain	
Sgb25	0.4925	md RO/OR3/2	3.979	1.774	1.767	0.007	mo. Pink	inert	colour zoning	
									cross needles, fingerprint?	

Appendix A (Continue).

Sample	Carats	GIA Color	SG.	RI.		Birefringence	Luminescence		Inclusion	Comment
				Max.	Min.		LW	SW		
Sgb26	0.4125	rO3/4	4.117	1.780	1.772	0.008	w. Orange	inert	crack, iron stain	
Sgb27	0.4245	RO/OR4/3	4.035	1.778	1.770	0.008	mo. Pink	inert	minute particle, look-like black silk and ???	
Sgb28	0.5130	RO/OR4/3	3.894	1.773	1.765	0.008	mo. Pink	inert	iron stain, minute particle, fracture, needle	
Sgb29	0.3790	rim R5/1 core O2/2	3.982	1.773	1.766	0.007	w. Red	inert	crack, zoning, gr. of cross needle	
Sgb30	0.3070	PR/RP2/1 pat. R2/2	3.904	1.777	1.769	0.008	w. Red	inert	zoning*, cross needle	
Sgb31	0.3300	rim lVB7/3 core	3.967	1.764	1.756	0.008	inert	inert	zoning, cross needle with fingerprint, minute	
Sgb32	0.6195	rim lVB7/3 core	3.937	1.770	1.761	0.009	inert	inert	zoning, needle and fingerprint,	
Sgb33	0.4180	mB3/1	3.953	1.775	1.767	0.008	inert	inert	xx epidote	
Sgb34	0.3995	vB4/3	3.834	1.769	1.762	0.007	inert	inert	unk elongate & small cryt	
Sgb35	0.5685	vB3/3	3.982	1.774	1.765	0.009	inert	inert	xx epidote	
Sgb36	0.3570	B3/1	3.916	1.777	1.770	0.007	inert	inert	unk flat cryt	
Sgb37	0.3335	drP5/3	3.847	1.773	1.765	0.008	w. Red	inert	negative cryt	
Sgb38	0.5600	mDR4/3 & lV8/1	3.948	1.768	1.761	0.007	w. Red	inert	zoning, cross needle & fingerprint	
Sgb39	0.3115	RO/OR3/2 & lP6/3	3.934	1.778	1.769	0.009	mo. Pink	inert		
Sgb40	0.4025	P2/1	3.720	1.774	1.766	0.008	w. Red	inert	4 small cryt	
Sgb41	0.3640	rim stpR3/3 mid	3.865	1.774	1.768	0.006	w. Red	inert	2 orange rutiles & unk	
Sgb42	0.4300	P3/1	3.884	1.774	1.766	0.008	w. Red	inert		
Sgb43	0.4415	bP6/3	3.847	1.773	1.765	0.008	inert	inert	xx minute brown particle	
Sgb44	0.4990	vB7/3 & moY2/3	3.951	1.775	1.768	0.007	inert	inert	short & long needles (2-axis)	
Sgb45	0.5095	V4/4, YG/GY2/1	3.973	1.773	1.764	0.009	w. Red	inert	long needle (3 axis), fingerprint, unk small cryt	
Sgb46	0.3520	rim V5/2 core Y3/3	3.861	1.771	1.764	0.007	w. Red	inert	zoning, rarely fingerprint & needle	
Sgb47	0.3700	C(W)	3.825	1.774	1.766	0.008	inert	inert	zoning, rarely needle	
Sgb48	0.2045	gY2/3	3.778	1.772	1.764	0.008	inert	inert	short & long needle (3 axis), fingerprint, minute	
Sgb49	0.1605	styG2/3	4.054	1.778	1.769	0.009	inert	inert	brown fingerprint	
Sgb50	0.1310	near-colourless	3.736	1.777	1.769	0.008	inert	inert	fracture, minute particle/fingerprint?, needle	
Sgb51	0.1670	l.Y2/2	2.299	1.772	1.765	0.007	inert	inert	twining	
Sgb52	0.2005	YG/GY2/1	3.574	1.775	1.768	0.007	inert	inert	cross & short needle, fine fingerprint	
									fracture, elongate fingerprint	

Appendix B Chemical composition of some Songea corundums by Energy Dispersive X-Ray Fluorescence (wt.%).

Sample	carats	Fe ₂ O ₃	Ga ₂ O ₃	TiO ₂	V ₂ O ₅	Cr ₂ O ₃
Sga1	0.4470	1.4068	0.0113	0.0526	0.0121	0.2526
Sga2	0.4505	1.1622	0.0099	0.0840	0.0106	0.0847
Sga3	0.4710	1.6928	0.0121	0.0284	0.0069	0.0543
Sga4	0.5100	1.2118	0.0111	0.0354	0.0073	0.0501
Sga5	0.5295	1.4879	0.0126	0.0452	0.0091	0.0833
Sga6	0.4960	1.8658	0.0199	0.0267	0.0044	0.0562
Sga7	0.5935	1.4643	0.0120	0.0304	0.0102	0.0231
Sga8	0.5445	0.9783	0.0102	0.0392	0.0005	0.0201
Sga9	0.5130	1.1694	0.0102	0.0143	0.0032	0.0038
Sga10	0.5420	1.2140	0.0099	0.0235	0.0074	0.0498
Sga11	0.5840	1.0277	0.0101	0.0242	0.0074	0.0083
Sga12	0.6390	1.2551	0.0128	0.0152	0.0021	0.0255
Sga13	0.5030	1.1795	0.0106	0.0173	0.0033	0.0226
Sga14	0.5170	1.4572	0.0136	0.0303	0.0000	0.0390
Sga15	0.5200	1.2035	0.0105	0.0265	0.0045	0.0294
Sga16	0.2340	1.2141	0.0133	0.0410	0.0028	0.0019
Sga17	0.2585	1.3661	0.0130	0.0504	0.0020	0.0221
Sga18	0.2580	1.5537	0.0121	0.0882	0.0072	0.0000
Sga19	0.2760	1.2295	0.0112	0.0456	0.0030	0.0109
Sga20	0.2535	1.2857	0.0130	0.0669	0.0014	0.0014
sgb21	0.4855	0.0095	0.2438	0.0106	0.373	1.4516
sgb22	0.3475	0.0094	1.3714	0.0414	0.543	1.3979
sgb23	0.3630	0.0111	0.0799	0.013	0.1585	1.3712
sgb24	0.5945	0.0026	0.0456	0.0037	0.0788	1.0417
sgb25	0.4925	0.0095	0.0398	0.0063	0.1102	1.0428
sgb26	0.4125	0.0134	0.1033	0.0121	0.2992	1.3989
sgb27	0.4245	0.009	0.0809	0.0083	0.3342	1.2822
sgb28	0.5130	0.0093	0.032	0.0025	0.1498	1.1967
sgb29	0.3790	0.0118	0.0821	0.0000	0.0692	1.0621
sgb30	0.3070	0.0098	0.0284	0.0016	0.109	1.0442
sgb31	0.3300	0.0237	0.1379	0.0167	0.0386	2.5838
sgb32	0.6195	0.0061	0.0454	0.0021	0.0222	1.0864

Appendix E (Continue).

Sample	carats	Fe ₂ O ₃	Ga ₂ O ₃	TiO ₂	V ₂ O ₅	Cr ₂ O ₃
sgb33	0.4180	0.0141	0.1646	0.0072	0.0297	2.0559
sgb34	0.3995	0.0146	0.0675	0.0083	0.0109	1.2155
sgb35	0.5685	0.0112	0.0638	0.0033	0.0061	1.3047
sgb36	0.3570	0.011	0.0195	0.0104	0.0129	1.1317
sgb37	0.3335	0.0236	0.1641	0.0151	0.1372	1.908
sgb39	0.3115	0.0086	0.0364	0.0054	0.0509	1.2168
sgb40	0.4025	0.0131	0.1501	0.004	0.0126	1.2482
sgb41	0.3640	0.0094	0.0493	0.0022	0.1242	1.0896
sgb42	0.4300	0.0104	0.2288	0.0000	0.046	1.1188
sgb43	0.4415	0.006	0.0873	0.0081	0.0589	1.0125
sgb44	0.4990	0.0747	0.0233	0.0000	0.0294	0.5991
sgb45	0.5095	0.0088	0.0918	0.0000	0.0195	1.0798
sgb46	0.3520	0.0134	0.0587	0.013	0.0000	1.3362
sgb47	0.3700	0.0169	0.2377	0.0000	0.033	2.2597
sgb48	0.2045	0.0133	0.1322	0.0051	0.0086	1.336
sgb49	0.1605	0.0147	1.0969	0.0000	0.0000	4.3936
sgb50	0.1310	0.0105	0.1533	0.0124	0.0689	1.2087
sgb51	0.1670	0.014	0.1395	0.0097	0.0111	1.1264
sgb52	0.2005	0.0227	0.1642	0.0253	0.0000	1.2516

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Appendix C Trace element contents of the Songea corundum, obtained by LA-ICP-MS.

Sample	sga5		sga4		sga18		sga11	
	rim1	core2	rim1	core2	rim1	core2	rim1	core2
Raw data	rim1	rim3	rim1	rim3	rim1	rim3	rim1	rim3
	red	red	orange	reddish	yellowish	yellowish	orange	orange
			yellow	orange	green	green	yellow	yellow
Li7	0.79	1.26	0.73	1.1	0.93	0.98	0.98	0.83
Be9	0.72	0.77	0.54	0.62	0.58	0.83	0.49	0.69
Na23	15.31	24.87	21.37	29.95	18.35	29.23	18.96	25.71
Mg24	27.71	34.8	22.38	19.81	21.52	35.58	17.1	15.28
Al27	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40
Ti47	57.66	72.34	39.69	41.17	42.68	62.89	24.29	22.81
V51	74.32	70.09	23.94	26.6	9.79	7.69	9.66	9.14
Cr53	2803.12	2524.18	524.06	1269.14	1.17	1.19	241.54	256.54
Mn55	0.143	0.228	0.129	0.194	0.162	0.185	0.174	0.227
Fe57	7018.94	6721.79	6139.7	5949.62	5571.15	5429.26	6161.13	6229.42
Ni60	3.64	3.19	0.327	0.43	0.178	0.36	0.384	0.35
Zn66	1.17	0.85	0.255	0.299	0.94	1.41	2.55	1.69
Ga71	54.88	55.16	55.72	55.99	56.55	56.83	57.38	57.66
Sn118	0.175	0.243	0.187	0.302	0.208	0.413	0.297	0.174
Total %	53.93	53.88	53.61	53.66	53.50	53.49	53.58	53.59

Appendix C (Continue).

Sample	sga15		sga7		sgd99							
	rim1 purple red	core2 purple red	rim3 purple red	rim1 purple	core2 purple	rim3 purple	rim1 blue purple	core2 blue purple	core3 blue purple	core4 purple	core5 purple	rim6 purple
Raw data												
Li7	0.68	0.88	0.62	0.7	1.01	0.7	0.71	0.84	0.65	0.69	0.63	0.72
Be9	0.68	0.87	0.53	0.62	0.75	0.59	0.51	0.65	0.51	0.57	0.54	0.81
Na23	78.59	18.49	12.62	23.3	27.46	21.93	13.22	16.6	18	20.4	13.53	23.38
Mg24	19.9	21.19	19.63	22.65	21.14	24.89	16.98	22.53	24.96	21.51	24.45	23.05
Al27	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40	529250.40
Ti47	37.2	40.18	39.76	40.48	37.82	42.19	34.62	47.21	46	42.32	42.76	42.32
V51	10.76	10.49	10.44	10.59	10.43	10.9	42.42	47.49	40.57	38.28	36.91	37.67
Cr53	217.63	221.83	223.98	185.8	170.11	186.45	293.45	330.63	560.67	847.43	1293.57	2485.9
Mn55	0.13	0.169	0.114	0.132	0.171	0.131	0.109	0.141	0.119	0.121	0.117	0.124
Fe57	5772.25	5752.39	5696.86	5187.13	4993.73	5532.95	5873.65	6580.5	6719.17	6940.46	6850.24	6757.3
Ni60	0.272	0.209	0.298	0.184	0.303	0.214	0.844	0.688	0.922	0.619	0.68	0.807
Zn66	0.46	0.303	0.665	0.994	0.75	0.645	0.269	0.41	0.427	0.285	0.438	0.524
Ga71	58.22	58.50	58.77	59.05	59.33	59.61	59.89	60.16	60.44	60.72	61.00	61.28
Sn118	0.349	0.271	0.29	0.298	0.283	0.289	0.308	0.121	0.246	0.194	0.244	0.277
Total %	53.54	53.54	53.53	53.48	53.46	53.51	53.56	53.64	53.67	53.72	53.76	53.87

BIOGRAPHY

Miss Pantaree Lomthong was born in February 1, 1977, at Bangkok. She graduated with a bachelor degree in general science from the Department of General Science, Faculty of Science, Kasetsart University in 2001. At present, she studies in a Master program in earth science at Chulalongkorn University.



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