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Appendices

Appendix A

05-0418					Wavelength= 1.5405					
SrCO ₃	2θ	Int	h	k	l	2θ	Int	h	k	l
Strontium Carbonate	20.318°	14	1	1	0	63.922°	9	3	3	0
	21.099°	6	0	2	0	65.218°	6	2	4	2
	25.171	100	1	1	1	65.460°	7	1	1	4
Strontianite, syn	25.801°	70	0	2	1	66.118°	5	1	5	2
	29.613°	22	0	0	2	66.629°	4	0	6	0
Rad.: CuKα1 λ: 1.5405 Filter: Ni Beta □ M d-sp:	31.259°	5	1	2	1	72.008°	10	3	3	2
Cut off: Int.: Diffract. I/feor.:	31.496°	20	0	1	2	72.819°	4	2	0	4
Ref: Swanson, Fuyat, Natl. Bur. Stand. (U.S.), Circ. 539, III, 56 (1954)	34.520°	12	1	0	2	73.723°	13	3	1	3
	35.106°	23	2	0	0	74.222°	4	4	0	0
	36.174°	34	1	1	2					
	36.524°	40	1	3	0					
Sys.: Orthorhombic S.G.: Pmcn (62)	36.631°	33	0	2	2					
a: 5.107 b: 8.414 c: 6.029 A: 0.6070 C: 0.7165	39.769°	5	2	1	1					
α: β: γ: Z: 4 mp:	41.320°	16	2	2	0					
Ref: Ibid.	42.960°	7	0	4	0					
	44.080°	50	2	2	1					
	45.640°	26	0	4	1					
	46.560°	21	2	0	2					
Dx: 3.785 Dm: 3.760 SS/FOM ₃ (=140(.0051, 42)	47.690°	35	1	3	2					
	49.169°	3	1	4	1					
ω: 1.517 ηωβ: 1.663 εγ: 1.667 Sign.: 2V: 18°	49.920°	31	1	1	3					
Ref: Ibid.	50.270°	16	0	2	3					
	50.602°	4	2	3	1					
	51.639°	7	2	2	2					
	53.032°	5	0	4	2					
Color: Colorless	54.990°	3	3	1	0					
Pattern taken at 25 C. Sample from Mallinckrodt Chemical Works, CAS #: 14941-40-3. Spectroscopic analysis:	56.642°	4	2	4	0					
<0.1% Ba, 0.01% Ca, Li; <0.001% Al, K, Mn, Na;	57.242°	13	3	1	1					
<0.0001% Cu, Fe, Mg, Sr. There is also a rhombohedral form of SrCO ₃ stable above 912 C. Aragonite group, aragonite subgroup, C.D. Cell: a=6.029, b=8.414, c=5.107, a/b=0.7165, c/b=0.6070, S.G.=Pmcn(62), PSC: oP20. To replace 1-556 and 2-397. Mwt: 147.63. Volume[CD]: 259.07.	57.629°	3	1	5	0					
	58.860°	13	2	4	1					
	59.820°	11	1	5	1					
	61.467°	3	0	0	4					
	62.809°	6	2	2	3					
	63.702°	4	3	1	2					

31-0022		Wavelength= 1.5418				
LaAlO ₃		2θ	Int	h	k	l
Aluminum Lanthanum Oxide		23.460°	80	0	1	2
		33.409°	100	1	1	0
		39.398°	3	0	2	1
		41.201°	45	2	0	2
		41.319°	40	0	0	6
		47.952°	60	0	2	4
Rad.: CuKα1		52.597°	3	2	1	1
Filter: Ni		54.105°	20	1	2	2
Cut off: 40°		54.192°	11	1	1	6
Int.: Diffract.		59.735°	30	3	0	0
I/Icon.: 1/1		59.820°	30	2	1	4
Ref: Mizuno, M. et al., Yogyo Kyokaiishi (J. Ceram. Assoc. Jpn.), 82, 631 (1974)		59.906°	13	0	1	8
Sys.: Rhombohedral		70.151°	14	2	2	0
S.G.: R3m (160)		70.301°	19	2	0	8
a: 5.364	b:	c: 13.11	A:	C: 2.4441		
α:	β:	γ:	Z: 1	mp:		
Ref: Ibid.		75.163°	8	3	1	2
		75.303°	6	1	0	10
		80.105°	16	1	2	8
Dx: 2.363		Dm: SS/FOM ₁₇ =22 (.022, 34)				

PSC: hR7. To replace 9-72. Mwt: 213.89. Volume[CD]: 326.67.

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07-0239		Wavelength= 1.54056				
Mg(OH) ₂		2θ	Int	h	k	l
Magnesium Hydroxide		18.586°	90	0	0	1
		32.839°	6	1	0	0
		38.016°	100	1	0	1
		50.854°	55	1	0	2
Rad.: CuKα1		58.640°	35	1	1	0
Filter: Ni Beta		62.073°	18	1	1	1
Cut off: 40°		68.253°	16	1	0	3
Int.: Diffract.		68.823°	2	2	0	0
I/Icon.: 1.60		72.030°	12	2	0	1
Ref: Natl. Bur. Stand. (U.S.), Circ. 539, 6, 30 (1956)		80.513°	2	0	0	4
Sys.: Hexagonal		81.253°	10	2	0	2
S.G.: P3m1 (164)		87.099°	2	1	1	3
a: 3.147	b:	c: 4.769	A:	C: 1.5154		
α:	β:	γ:	Z: 1	mp:		
Ref: Ibid.		89.721°	4	1	0	4
		96.310°	6	2	0	3
		96.505°	2	2	1	0
		99.841°	8	2	1	1
		107.640°	2	0	0	5
		108.302°	6	1	1	4
		109.112°	8	2	1	2
		115.959°	4	3	0	0
		117.690°	<1	1	0	5
		118.263°	2	2	0	4
		119.368°	2	3	0	1
		126.054°	6	2	1	3
		141.620°	4	1	1	5
		156.687°	4	2	2	0
Dx: 2.363		Dm: SS/FOM ₂₄ =28 (.029, 32)				
ω: 1.561	ηωβ: 1.581	εγ:	Sign: + 2V:			
Ref: Ibid.						
Color: Colorless						
Pattern taken at 26°C. Sample prepared at NBS, Gaithersburg, MD, U.S.A. from MgO and water field at 600°C and 20,000 psi for 3 days. Spectroscopic analysis shows (wt.%): Ca <0.1, Ag, Al, B, Fe, Si, Sr, Ti <0.01, Ba, Cr, Cu <0.001, Cd I2 type. Brucite group, brucite subgroup. PSC: hPS Mwt: 58.32. Volume[CD]: 40.90.						

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43-1454

Wavelength= 1.54056

Al ₂ O ₃		2 θ	Int	h	k	l	2 θ	Int	h	k	l
Aluminum Oxide											
		25.576°	72	0	1	2	104.635	<1	1	3	7
		35.150°	98	1	0	4	109.522	1	3	2	1
		37.767°	44	1	1	0	109.850	<1	1	2	11
Corundum, syn											
Rad.: CuK α 1 λ : 1.5405		Filter: Mono		d-sp: Calculated							
Cut off: 15.0		Int.: Calculated		I/Icon.: .977							
Ref: Grier, D., McCarthy, G., North Dakota State University, Fargo, North Dakota, USA, ICDD Grant-in-Aid, (1991)											
Sys.: Rhombohedral S.G.: R3c (167)											
a: 4.7592	b:	c: 12.992	A:	C: 2.7299							
α :	β :	γ :	Z: 6	mp:							
Ref: Ibid											
Dx: 3.986		Dm:		SS/FOM ₃₀ =416(.0024, 30)							
Peak height intensity. Calculation of diffractometer peak intensities done with MICRO-POWD v 2.2 (D. Smith and K. Smith) using default instrument broadening function (NBS Table), diffracted beam monochromator polarization correction, and atomic scattering factors corrected for anomalous dispersion. Cell parameters from D. Smith documentation for MICRO-POWD sample file (original structure data after Newnham and DeHaan). Atomic positions from same source: Al in 12c with z=0.352, O in 18e with x=0.306. Isotropic thermal parameters also from Smith: Al, B=0.14; O, B=0.22. Al ₂ O ₃ type. PSC: hR10. Mwt: 101.96. Volume[CD]: 254.84.											
		46.175°	2	2	0	2	114.068	3	2	2	9
		52.548°	48	0	2	4	116.080	13	3	2	4
		57.498°	96	1	1	6	116.610	10	0	1	14
		59.738°	3	2	1	1	117.838	8	4	1	0
		61.124°	4	1	2	2					
		61.303°	9	0	1	8					
		66.514°	38	2	1	4					
		68.202°	57	3	0	0					
		70.411°	1	1	2	5					
		74.300°	1	2	0	8					
		76.873°	17	1	0	10					
		77.234°	10	1	1	9					
		80.415°	1	2	1	7					
		80.692°	7	2	2	0					
		83.208°	1	3	0	6					
		84.348°	5	2	2	3					
		85.135°	<1	1	3	1					
		86.347°	4	3	1	2					
		86.500°	4	1	2	8					
		88.997°	8	0	2	10					
		90.705°	2	0	0	12					
		91.179°	10	1	3	4					
		94.816°	<1	3	1	5					
		95.236°	19	2	2	6					
		98.380°	2	0	4	2					
		101.064	14	2	1	10					
		102.817	<1	1	1	12					
		103.301	3	4	0	4					

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36-1481

Wavelength= 1.54059

La(OH) ₃		2 θ	Int	h	k	l
Lanthanum Hydroxide						
		15.665°	59	1	0	0
		27.309°	62	1	1	0
		27.973	100	1	0	1
		31.624°	16	2	0	0
		36.014°	8	1	1	1
		39.478°	75	2	0	1
		42.268°	12	2	1	0
		47.063°	13	0	0	2
		48.265°	38	3	0	0
		48.644°	61	2	1	1
		49.891°	9	1	0	2
		55.265°	21	1	1	2
		56.312°	10	2	2	0
		57.822°	6	2	0	2
		58.866°	6	3	1	0
		64.028°	15	3	1	1
		65.096°	6	2	1	2
		66.040°	3	4	0	0
		69.708°	14	3	0	2
		70.948°	4	4	0	1
		72.859°	2	3	2	0
		75.800°	8	1	0	3
		76.341°	9	2	2	2
		77.279°	14	4	1	0
		77.592°	14	3	2	1
		78.522°	5	3	1	2
		82.280°	5	2	0	3
Rad.: CuK α 1 λ : 1.5405 Filter: Graph Mono d-sp: Diffractometer						
Cut off: 17.7 Int.: Diffract. I/Icon.:						
Ref: McMurdie, H et al., Powder Diffraction, 1, 90 (1986)						
Sys.: Hexagonal S.G.: P6 ₃ /m (176)						
a: 6.5286(5)	b:	c: 3.8588(5)	A:	C: 0.5911		
α :	β :	γ :	Z: 2	mp:		
Ref: Ibid						
Dx: 4.428		Dm:		SS/FOM ₂₀ =82(.0107, 31)		
Color: Colorless						
Peak height intensity. The mean temperature of data collection was 24.7 C. CAS #: 14507-19-8. La ₂ O ₃ was heated with an excess of water and the mixture was refluxed for 4 days, filtered by suction and dried at 105 C for a few hours. See 6 586.g(1,gb)- [3]. The structure was determined qualitatively by Zachariasen, W., Acta Crystallogr., 1, 265 (1948). Tungsten used as an internal stand. PSC: hP14. Mwt: 189.93. Volume[CD]: 142.44.						

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Appendix B

XRD data of calcined powder mixed with Si

LaAlO₃ (Std)

No.	2-theta	d	I/I ₀
1	23.443	3.78253	48
2	33.383	2.67742	100
3	41.183	2.18725	43
4	47.943	1.89381	37
5	54.023	1.69437	21
6	59.663	1.54711	33
7	70.173	1.33961	17
8	75.063	1.26360	10
9	79.943	1.19834	15
10	84.683	1.14299	11
11	89.383	1.09470	8



Biography

Miss Sacwapap Ragsapram was born on 28th of February in 1976. She was born in Bangkok. After graduating with a Bachelor Degree in Materials Science from Faculty of Science, Chulalongkorn University in 1998, she continued the further study in Mater Degree in the field of Ceramic Technology and graduated in April 2000.