

**Table S1** REE contents in jingwenite–(Y) and wenlanzhangite–(Y) as determined by LA–ICP–MS.

Spot	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Y	Ho	Er	Tm	Yb	Lu	ΣREE	ΣHREE	Y/Ho	σEu
ppm																			
Jw–Y–1	30	145	45	643	1189	207	4760	1877	19674	144237	5766	21341	3969	31037	4506	239425	237165		
Jw–Y–2	20	85	27	448	1065	196	4586	1800	19233	142464	5637	22081	4405	36419	5385	243851	242009		
Jw–Y–3	2	24	17	381	1108	171	5099	2057	22124	149050	6330	22963	4251	32310	4652	250539	248836		
Jw–Y–4	6	52	26	477	1145	172	5092	2073	21998	149483	6437	23082	4023	29528	4080	247674	245796		
Jw–Y–5	5	54	25	416	900	146	4388	1868	20190	151819	5941	20885	3551	24957	3536	238681	237135		
Jw–Y–6	4	52	29	515	1073	182	4926	2149	23372	148885	6493	23510	4140	29793	3991	249114	247260		
Jw–Y–7	21	206	66	694	1058	181	4318	1776	19794	133759	6090	24436	4916	41270	6142	244728	242501		
Jw–Y–8	8	53	24	447	1027	153	4644	1939	20616	144786	6119	22995	4033	30484	4134	241462	239751		
Jw–Y–9	4	30	17	336	835	132	4354	1906	20966	155761	6338	22277	3863	27574	3839	248232	246877		
Jw–Y–10	34	373	112	1155	1447	223	5589	2330	23954	145966	6735	25108	4365	33133	4206	254729	251385		
Wlz–Y–1	18	450	250	3257	3508	453	8342	2988	29062	134431	7468	25172	4526	33732	4051	257710	249773		
Wlz–Y–2	60	1678	867	10058	7408	1027	13045	4038	32958	130944	7235	22288	3482	22794	2444	260326	239228		
Wlz–Y–3	28	701	387	4774	4298	597	9808	3386	30131	130967	7473	23901	3975	26464	2943	249831	239047		
Wlz–Y–4	33	407	133	1363	1381	195	4599	2222	26035	131378	8034	30337	5674	41999	5381	259172	255659		
Wlz–Y–5	67	1146	485	5540	4370	562	8883	3005	28504	134971	7577	26041	4577	32423	3978	262129	249959		
Wlz–Y–6	38	1009	543	6227	4824	707	9790	3281	29552	142397	7597	25486	4466	31896	3851	271662	258316		
Wlz–Y–7	257	2942	882	6740	4400	453	8975	2973	29669	148239	8268	31117	5646	41845	5290	297697	282023		

Note: σEu = Eu/Eu\*

**Table S2.** X-ray powder diffraction data (*d* in Å, *I* in %) for wenlanzhangite-(Y).

<i>d</i> <sub>calc</sub>	<i>I</i> <sub>cal</sub>	( <i>hkl</i> )	<i>d</i> <sub>meas</sub>	<i>I</i> <sub>meas</sub>
<b>9.8056</b>	<b>63</b>	<b>(00-1)</b>		
5.4237	10	(10-1)	5.460	6
5.0244 <b>5.0238</b>	30 <b>55</b>	(1-10) <b>(110)</b>	5.030	52
4.7995 4.7493 4.7216	54 24 29	(020) (101) (-111)	4.753	28
4.3118 4.3098	12 59	(02-1) (021)	4.306	29
4.0816	23	(10-2)	4.109	9
3.7567 <b>3.7556</b> 3.7220	5 <b>67</b> 7	(11-2) <b>(-112)</b> (120)	3.736	9
3.5946 3.5939	19 37	(12-1) (-121)	3.591	21
3.5201	7	(102)		
3.4287	5	(022)		
3.3765 3.3752	24 49	(1-21) (121)	3.367	18
3.3054	6	(1-12)		
3.3043	35	(112)		
3.2685	14	(003)	3.254	5
3.1099 3.1087	9 35	(12-2) (-122)	3.108	9
2.9151 2.9143	6 39	(11-3) (-113)	2.911	8
2.8124 2.8121	34 26	(1-30) (130)	2.805	23
2.7561	20	(13-1)		
2.7556	8	(-131)		
<b>2.7023 2.7008 2.6115 2.6098</b>	<b>100 62 85 90</b>	<b>(02-3) (023) (2-11) (21-2)</b>	2.695 2.602	48 100
2.5926	17	(113)		
2.5177	6	(-132)		
2.5115	5	(-221)		
2.4514	16	(004)		
2.3998 2.3939	20 8	(040) (10-4)	2.395	6
2.3683	7	(1-32)		
2.3306	6	(041)		
2.2117	10	(13-3)		
2.2106	6	(-133)		
2.1836	19	(02-4)		
2.1826	10	(024)		
2.1683 2.168	5 14	(2-30) (230)	2.169	17
2.1678	6	(23-1)		
2.1678	18	(-231)		
2.1524	11	(104)		
2.1422	8	(1-41)		
2.0699 2.0693 2.0690 2.0686	25 49 26 53	(2-31) (231) (23-2) (-232)	2.064	51
1.996	8	(-214)		
1.9611	15	(005)		
1.9502	6	(10-5)		
1.9349	10	(04-3)		
1.9338	29	(043)	1.933	12
1.9072	7	(2-32)		
1.9061	7	(23-3)		
1.9055	12	(-233)		
1.8739	5	(301)		
1.8344	11	(-321)		
1.8187	8	(320)		

1.7877	10	(-322)	1.780	5
1.753	6	(1-15)		
1.7454	6	(321)		
1.737	14	(-152)		
1.7313 1.7310 1.7299 1.7296	5 25 6 34	(2-14) (214) (21-5) (-215)	1.728	13
1.7143	9	(044)		
1.6944	5	(-144)		
1.6869	7	(-243)		
1.6343	16	(006)	1.631	4
1.6258	6	(1-5-3)		
1.6160	6	(11-6)		
1.5998	6	(060)		
1.5831	5	(303)		
1.5675 1.5670 1.5668	18 19 8	(2-51) (25-2) (-252)	1.568	7
1.5629	5	(153)		
1.5425	18	(2-34)	1.542	7
1.5414	20	(23-5)		
1.5408	5	(-235)		
1.5118	10	(2-15)		
1.5106	11	(21-6)		
1.5104	6	(-216)		
1.5053	7	(30-5)		
1.4926	8	(252)		
1.4922	8	(-253)		
1.4908	36	(40-1)	1.490	6
1.487	9	(-315)		
1.4373	18	(06-3)		
1.4366	6	(063)		
1.4174	6	(-163)		
1.3806	5	(235)		
1.3797	9	(-236)		
1.3512	8	(04-6)		
1.3449	8	(02-7)		
1.3058	8	(4-22)		
1.3056	6	(422)		
1.3049	9	(42-4)		
1.3048	8	(-424)		

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**Table S3.** Calculated bond valences (*v.u.*) for atoms in wenlanzhangite-(Y)

	Y1 Dy1	Y2 Dy2	Dy3	Dy4	V1 Al1	V2 Al2	V3 Al3	V4 Al4	V5 Al5	Si1	Si2	Sum
<b>O1</b>		0.40 <sup>×1↓1→</sup>		0.02 <sup>×1↓1→</sup>	0.52 <sup>×1↓1→</sup>						0.93 <sup>×1↓1→</sup>	<b>1.87</b>
<b>O2</b>	0.39 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>			0.52 <sup>×1↓1→</sup>				0.91 <sup>×1↓1→</sup>		<b>1.83</b>
<b>O3</b>		0.44 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>				0.45 <sup>×2↓1→</sup>		0.95 <sup>×1↓1→</sup>		<b>1.85</b>
<b>O4</b>	0.42 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>				0.48 <sup>×1↓1→</sup>				0.93 <sup>×1↓1→</sup>	<b>1.84</b>
<b>O5</b>		0.45 <sup>×1↓1→</sup>		0.02 <sup>×1↓1→</sup>		0.52 <sup>×1↓1→</sup>					0.93 <sup>×1↓1→</sup>	<b>1.92</b>
<b>O6</b>	0.41 <sup>×1↓1→</sup>		0.02 <sup>×1↓1→</sup>		0.57 <sup>×1↓1→</sup>					0.93 <sup>×1↓1→</sup>		<b>1.93</b>
<b>O7</b>				0.01 <sup>×1↓1→</sup>				0.49 <sup>×2↓1→</sup>	0.43 <sup>×2↓1→</sup>		0.96 <sup>×1↓1→</sup>	<b>1.89</b>
<b>O8</b>			0.01 <sup>×1↓1→</sup>				0.52+0.50 <sup>×1↓1→</sup>			0.91 <sup>×1↓1→</sup>		<b>1.94</b>
<b>O9</b>		0.38+0.32 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>	0.56 <sup>×1↓1→</sup>	0.54 <sup>×1↓1→</sup>						<b>1.81</b>
<b>O10</b>	0.4 <sup>×1↓1→</sup>		0.01+0.01 <sup>×1↓1→</sup>		0.17 <sup>×1↓1→</sup>	1.21 <sup>×1↓1→</sup>						<b>1.80</b>
<b>O11</b>	0.31+0.36 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>		0.57 <sup>×1↓1→</sup>	0.56 <sup>×1↓1→</sup>						<b>1.81</b>
<b>O12</b>		0.42 <sup>×1↓1→</sup>		0.01+0.01 <sup>×1↓1→</sup>	1.16 <sup>×1↓1→</sup>	0.16 <sup>×1↓1→</sup>						<b>1.76</b>
<b>O13(OH)</b>	0.35 <sup>×1↓1→</sup>						0.47+0.48 <sup>×1↓1→</sup>					<b>1.30</b>
<b>O14(OH)</b>		0.34 <sup>×1↓1→</sup>						0.48 <sup>×2↓1→</sup>	0.46 <sup>×2↓1→</sup>			<b>1.28</b>
<b>O15(OH)</b>		0.33 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>					0.53 <sup>×2↓1→</sup>			<b>0.87</b>
<b>O16(OH)</b>	0.35 <sup>×1↓1→</sup>		0.01 <sup>×1↓1→</sup>				0.61 <sup>×1↓1→</sup>					<b>0.97</b>
<b>Sum</b>	<b>2.99</b>	<b>3.08</b>	<b>0.09</b>	<b>0.10</b>	<b>3.55</b>	<b>3.51</b>	<b>3.06</b>	<b>2.84</b>	<b>2.84</b>	<b>3.70</b>	<b>3.75</b>	

*Note* that the bond valences were calculated using the equation and constants of Brown (1977),  $S = \exp[R_0 - d_0]/b$ . Bond-valence parameters are from Gagné and Hawthorne (2015) and the bond valence at the Y|Dy and V|Al sites were calculated based on the occupancy from crystal structure refinement.