Supplementary Material

This file includes:
Supplementary Figures S1–2; Supplementary Tables S1–4.

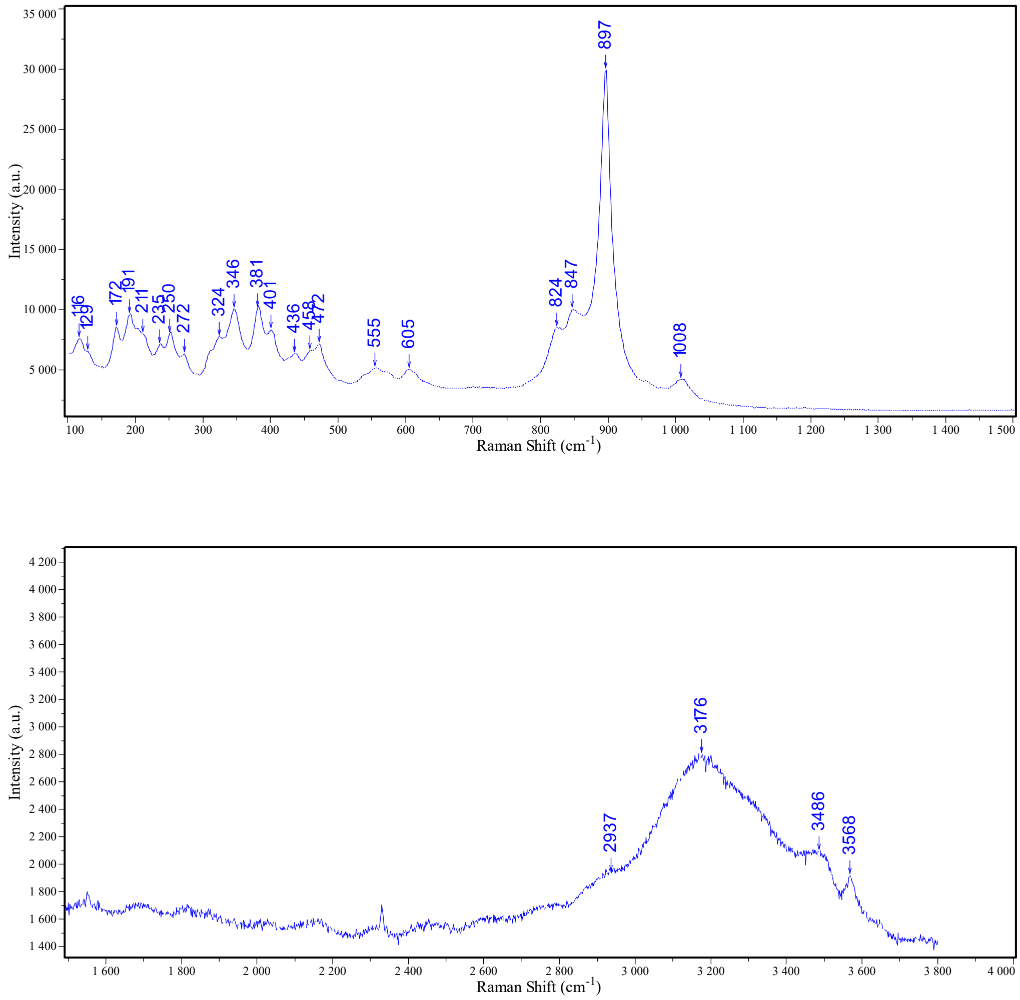

Fig.S1 Raman spectra for jingwenite–(Y)

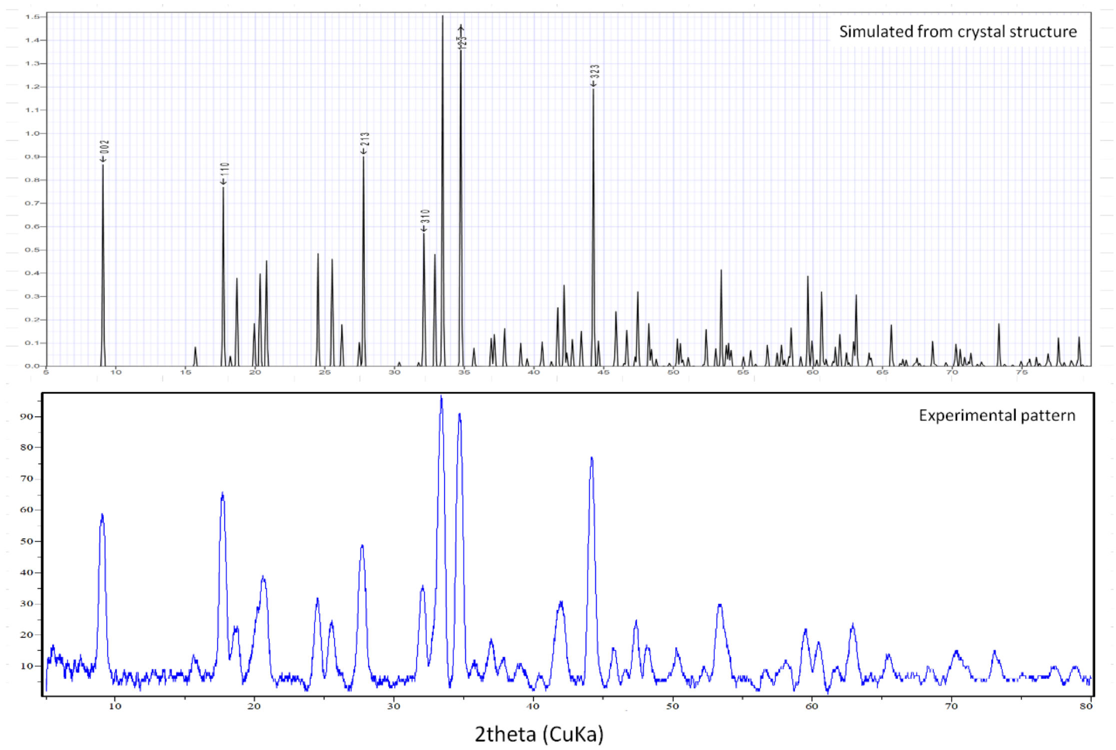

Fig. S2. Simulated and measured powder X–ray diffraction patterns for jingwenite–(Y)

Table S1 EPMA data for jingwenite–(Y) (wt.%).

Constituent	Mean	Range	Stand. Dev.	*apfu*	Probe Standard
SiO_2	16.45	16.07–16.67	0.15	2	Albite
Al_2O_3	10.85	10.10–11.66	0.46	1.55	Amphibole (B5)
Fe_2O_3	0.89	0–1.87	0.55	0.08	Amphibole (B5)
VO_2	26.13	25.06–28.31	0.89	2.3	$Ca_3(VO_4)_2$
TiO_2	1.83	0.06–3.74	1.3	0.17	Amphibole (B5)
Y_2O_3	24.67	21.97–27.43	1.37	1.6	YPO_4
Nd_2O_3	0.03	0–0.13	0.03	0.001	REE2
Sm_2O_3	0.1	0.04–0.33	0.07	0.004	REE2
Gd_2O_3	0.69	0.45–0.94	0.12	0.03	REE1
Tb_2O_3	0.32	0.22–0.52	0.08	0.01	REE1
Dy_2O_3	3.25	2.54–4.23	0.47	0.13	REE4
Ho_2O_3	0.83	0.63–1.04	0.13	0.03	REE4
Er_2O_3	3.55	2.80–4.37	0.44	0.14	REE4
Tm_2O_3	0.6	0.39–0.87	0.1	0.02	REE1
Yb_2O_3	3.99	2.86–5.86	0.69	0.15	REE2
Lu_2O_3	2.4	1.21–4.01	0.73	0.09	REE2
H_2O*	4.65				
Total	101.23	101.52–102.47	0.25		

Note: *The H_2O content was calculated on the basis of stoichiometry. Based on the empirical formula of jingwenite-(Y), recalculated mean contents of VO_2 and V_2O_3 are 21.65 wt.% and 4.04 wt.%, respectively.

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

I_{cal}	I_{meas}	d_{meas}	d_{calc}	*hkl*	I_{cal}	I_{meas}	d_{meas}	d_{calc}	*hkl*
73.3	58.4	9.728	9.715	0 0 2	12.4	3.4	1.946	1.947	0 0 10
10.5	7.9	5.643	5.659	0 1 1	16.4	19.1	1.919	1.915	4 0 –6
79.5	61.8	5.011	5.000	1 1 0	5.5	10.1	1.889	1.885	–3 2 5
26.1	13.5	4.753	4.747	2 0 0	4.7	13.5	1.814	1.813	1 1 –10
17.6	4.5	4.457	4.475	–1 1 2	11.9	5.6	1.749	1.749	–2 3 3
40.8	23.6	4.363	4.393	0 1 3	3.0	10.1	1.726	1.724	4 1 7
28.1	36.0	4.274	4.305	2 0 –2	25.8	27.0	1.715	1.712	1 2 –9
31.7	30.3	3.636	3.622	–2 1 1	6.1	4.5	1.697	1.695	–5 1 4
41.0	20.2	3.492	3.484	1 1 –4	7.0	6.7	1.621	1.622	0 0 12
7.9	3.4	3.403	3.402	2 0 –4	6.2	3.4	1.605	1.598	0 3 7
63.5	50.6	3.216	3.210	–2 1 3	8.7	10.1	1.581	1.585	–5 1 6
53.3	29.2	2.791	2.790	3 1 0	20.8	16.9	1.551	1.551	5 2 3
42.3	14.6	2.724	2.720	1 1 –6	19.8	13.5	1.526	1.529	3 2 9
60.0	100.0	2.676	2.676	2 0 6	9.9	6.7	1.497	1.501	1 2 11
100.0	95.5	2.582	2.581	1 2 3	18.8	21.4	1.474	1.475	0 4 0
9.2	4.5	2.514	2.506	0 1 7	9.8	9.0	1.422	1.423	6 0 6
8.1	12.4	2.432	2.429	0 0 8	5.9	5.6	1.369	1.370	3 2 –11
11.1	6.7	2.377	2.373	4 0 0	3.4	3.4	1.338	1.343	4 0 12
6.8	7.9	2.310	2.304	4 0 –2	3.9	10.1	1.333	1.336	2 0 14
1.9	4.5	2.226	2.230	2 2 4	5.7	3.4	1.323	1.327	7 1 0
5.4	13.5	2.167	2.173	2 0 –8	8.2	10.1	1.291	1.292	2 4 6
14.0	29.2	2.163	2.152	2 0 8	1.7	2.3	1.260	1.263	–5 3 6
56.6	82.0	2.049	2.047	–3 2 3	4.8	5.6	1.231	1.231	3 2 –13
9.7	13.5	1.979	1.980	1 2 –7	4.7	6.7	1.212	1.211	–6 3 3

Table S3 Information on crystal and structural refinement for jingwenite–(Y).

Crystal data	
Empirical formula	$Y_{1.52}Yb_{0.26}Er_{0.10}Dy_{0.12}Al_{1.58}Fe_{0.06}V_{2.27}Ti_{0.10}Si_2O_{16}H_4$
Formula weight	694.62
Crystal size/mm^3	0.01 × 0.008 × 0.006
Crystal system	monoclinic
Space group	*I*2/*a* (#15)
Unit cell dimensions	*a* = 9.4821(2) Å, *b* = 5.8781(1) Å *c* = 19.3987(4) Å *β* = 90.165 (2) °
Volume	1081.21(4) Å^3
Z	4
Density (calculated)	4.267 g/cm^3
Data collection and refinement	
Instrument	Rigaku Synergy
Radiation, wavelength, temperature	Cu *K*α, 1.54184 Å, 293(2) K
2θ range (°)	9.118 to 130.028
μ /mm^{-1}	41.934
F(000)	1298.0
Total reflections	5274
Unique ref (all)	913
Unique ref [$I > 4\sigma(I)$]	874
R_{int}	0.0267
R_{σ}	0.0185
Range of *h*, *k*, *l*	$-11 \le h \le 8$; $-6 \le k \le 6$; $-22 \le l \le 22$
R_1, wR_2 [$I > 4\sigma(I)$]	R_1 = 0.0246, wR_2 = 0.0692
R_1, wR_2 [all data]	R_1 = 0.0267, wR_2 = 0.0699
Goodness–of–fit	1.156
No. of parameters, restraints	111, 0
Maximum and minimum residual peak (e Å^{-3})	1.49/–0.80

Table S4 LA–MC–ICP–MS Sm–Nd isotope data of jingwenite–(Y).

Sample spot	$^{145}Nd/^{144}Nd$	1σ	$^{147}Sm/^{144}Nd$	1σ	$^{143}Nd/^{144}Nd$	1σ	εNd(t)	1σ
Jw–Y–01	0.34845	0.00003	0.65169	0.00273	0.51272	0.00003	–11.4	0.5
Jw–Y–02	0.34845	0.00003	0.73566	0.00186	0.51293	0.00003	–9.7	0.7
Jw–Y–03	0.34840	0.00002	0.78878	0.00273	0.51284	0.00003	–13.0	0.5
Jw–Y–04	0.34841	0.00006	0.89951	0.01200	0.51315	0.00005	–10.0	1.0
Jw–Y–05	0.34844	0.00003	0.59773	0.00211	0.51269	0.00002	–10.4	0.4
Jw–Y–06	0.34841	0.00003	0.96409	0.00328	0.51315	0.00004	–11.8	0.7
Jw–Y–07	0.34834	0.00003	0.93058	0.00409	0.51311	0.00003	–11.6	0.6
Jw–Y–08	0.34841	0.00002	0.75621	0.00075	0.51289	0.00003	–11.1	0.6
Jw–Y–09	0.34839	0.00004	0.69200	0.00375	0.51270	0.00003	–13.0	0.5
Jw–Y–10	0.34843	0.00003	0.85215	0.00134	0.51301	0.00003	–11.3	0.7
Jw–Y–11	0.34841	0.00004	0.72282	0.00637	0.51282	0.00004	–11.4	0.7
Jw–Y–12	0.34842	0.00004	0.42146	0.00273	0.51240	0.00002	–11.1	0.3
Jw–Y–13	0.34841	0.00003	0.79437	0.00141	0.51291	0.00003	–11.6	0.6
Jw–Y–14	0.34840	0.00003	0.91701	0.00542	0.51305	0.00004	–12.5	0.8
Jw–Y–15	0.34841	0.00003	0.81264	0.00427	0.51300	0.00002	–10.4	0.5
Jw–Y–16	0.34841	0.00003	0.64681	0.00312	0.51269	0.00002	–11.8	0.5
Jw–Y–17	0.34841	0.00003	0.75888	0.00682	0.51286	0.00003	–11.8	0.5
Jw–Y–18	0.34842	0.00003	0.87645	0.00180	0.51308	0.00003	–10.7	0.6
Jw–Y–19	0.34841	0.00004	0.60239	0.00550	0.51269	0.00003	–10.5	0.6
Jw–Y–20	0.34843	0.00003	0.82584	0.00268	0.51294	0.00003	–11.9	0.6