

Supplementary Material Table S1. EPMA data for Zhibula scheelite-powellite.

Point #	CaO wt.%	WO ₃ wt.%	MoO ₃ wt.%	Total wt.%	Ca apfu	W apfu	Mo apfu	Total apfu	Sch %mol	Pow %mol
Unzoned/weakly zoned W-rich domains										
1	20.0	77.3	2.70	100.0	1.008	0.944	0.053	0.997	94.6	5.4
2	20.0	76.5	2.78	99.2	1.016	0.939	0.055	0.995	94.4	5.6
3	20.1	75.4	4.44	100.0	1.006	0.911	0.087	0.998	91.3	8.7
4	20.1	74.5	3.86	98.5	1.023	0.915	0.077	0.992	92.2	7.8
5	20.0	74.2	4.60	98.8	1.011	0.905	0.091	0.996	90.9	9.1
6	20.3	72.8	6.13	99.3	1.011	0.877	0.120	0.996	88.0	12.0
7	20.3	72.2	6.11	98.6	1.015	0.875	0.120	0.995	87.9	12.1
8	20.3	71.4	6.86	98.6	1.013	0.862	0.134	0.996	86.5	13.5
9	20.4	70.9	6.61	97.9	1.025	0.861	0.130	0.992	86.9	13.1
Point #	CaO wt.%	WO ₃ wt.%	MoO ₃ wt.%	Total wt.%	Ca apfu	W apfu	Mo apfu	Total apfu	Sch %mol	Pow %mol
Patterned Mo-rich domains										
1	25.8	52.4	21.4	99.6	1.002	0.201	0.798	1.005	20.1	79.9
2	25.5	21.5	51.9	98.9	0.997	0.204	0.797	1.001	20.4	79.6
3	25.3	25.2	49.6	100.1	0.992	0.239	0.764	1.003	23.8	76.2
4	24.9	30.0	46.5	101.4	0.984	0.286	0.719	1.005	28.5	71.5
5	24.6	29.7	45.3	99.5	0.990	0.289	0.715	1.003	28.8	71.2
6	24.6	32.4	43.0	100.0	0.998	0.317	0.683	1.001	31.7	68.3
7	24.1	36.1	40.0	100.3	0.990	0.359	0.645	1.003	35.7	64.3
8	23.9	36.4	39.2	99.5	0.991	0.366	0.637	1.003	36.5	63.5
9	24.1	37.0	39.3	100.4	0.993	0.368	0.634	1.002	36.7	63.3
10	23.9	36.6	38.4	98.9	1.001	0.370	0.630	1.000	37.0	63.0
11	24.0	37.3	38.5	99.8	0.995	0.375	0.627	1.002	37.4	62.6
12	24.0	37.9	37.7	99.6	1.002	0.382	0.617	0.999	38.2	61.8
13	23.8	39.3	36.6	99.7	0.998	0.398	0.603	1.001	39.8	60.2
14	23.9	40.0	36.7	100.6	0.993	0.403	0.600	1.002	40.2	59.8
15	23.5	38.5	35.1	97.1	1.013	0.402	0.594	0.996	40.3	59.7
16	23.6	40.0	35.7	99.3	1.000	0.409	0.591	1.000	40.9	59.1
17	23.8	41.3	35.4	100.4	0.997	0.419	0.582	1.001	41.9	58.1
18	23.4	42.4	34.6	100.5	0.987	0.432	0.572	1.004	43.0	57.0
19	23.6	43.3	33.9	100.8	0.993	0.441	0.561	1.002	44.0	56.0
20	23.2	44.5	32.1	99.7	0.995	0.462	0.540	1.002	46.1	53.9
21	22.9	47.4	29.6	100.0	0.994	0.498	0.504	1.002	49.7	50.3
22	22.7	47.3	29.5	99.6	0.991	0.499	0.504	1.003	49.7	50.3
23	22.8	48.3	28.4	99.6	0.998	0.512	0.488	1.001	51.2	48.8
24	22.7	49.2	28.0	99.9	0.994	0.521	0.481	1.002	52.0	48.0
25	22.4	53.2	23.9	99.6	1.004	0.577	0.421	0.999	57.8	42.2
26	22.0	57.4	20.3	99.7	1.008	0.634	0.363	0.997	63.6	36.4
27	21.8	57.7	20.0	99.5	1.000	0.640	0.360	1.000	64.0	36.0
28	21.7	58.4	19.2	99.3	1.001	0.652	0.348	1.000	65.2	34.8
29	21.7	58.0	18.7	98.4	1.012	0.654	0.342	0.996	65.7	34.3
30	21.2	63.2	14.5	98.9	1.010	0.727	0.270	0.997	72.9	27.1

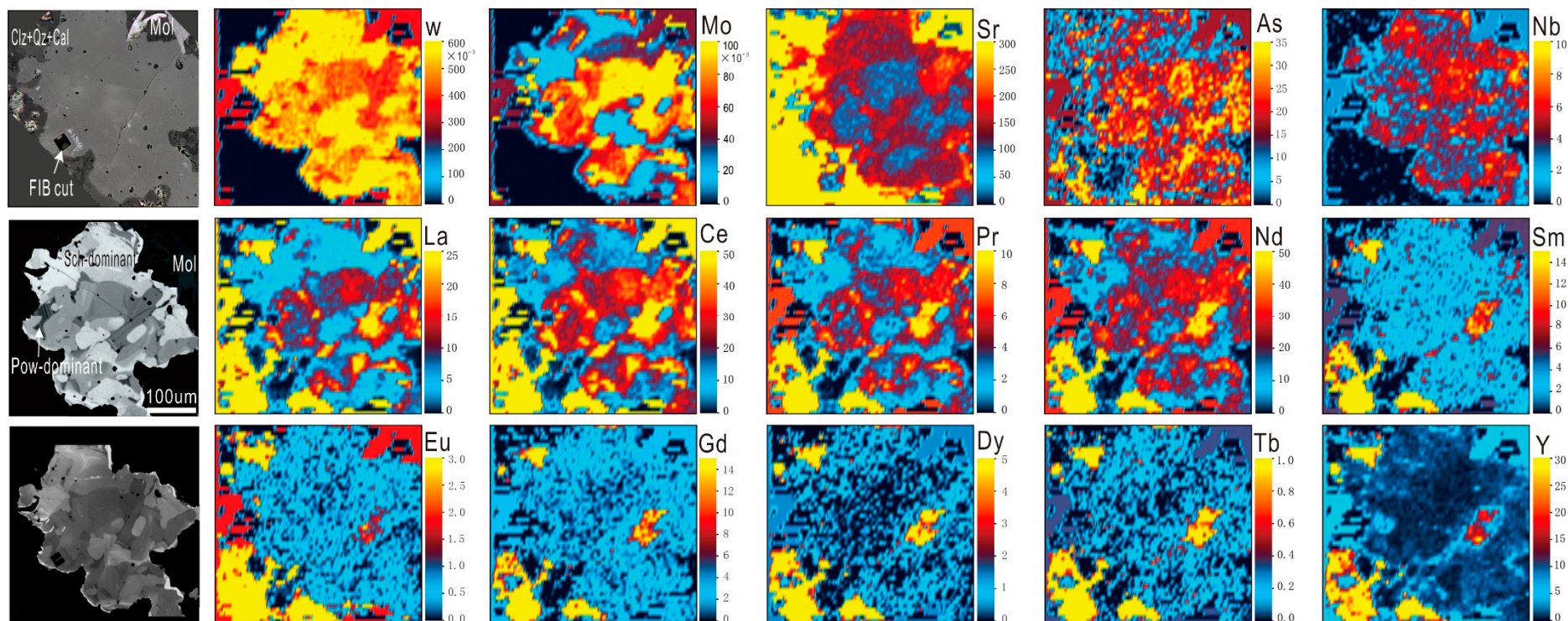
Supplementary Material Table S2. LA-ICP-MS data for Zhibula scheelite-powellite (ppm)

	Ti	Fe	As	Sr	Nb	Mo	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Y	Ho	Er	Tm	Yb	Lu	ΣREY	W
Scheelite-dominant (n=12)	0.91	13	23	140	5.2	29485	7.1	20	3.6	20	4.0	0.49	2.6	0.16	0.71	1.7	0.07	0.10	0.01	0.04	0.01	61	597184
	0.53	18	21	126	6.2	29474	8.3	24	4.2	25	5.2	0.51	3.7	0.31	1.0	2.8	0.16	0.25	0.02	0.06	0.01	76	608474
	1.1	12	22	124	5.2	28504	6.8	20	3.6	21	4.3	0.45	2.8	0.22	0.79	1.8	0.10	0.15	0.01	0.04	0.01	61	613560
	0.46	12	20	128	5.5	26605	7.8	22	4.1	23	4.9	0.46	3.4	0.28	0.76	2.0	0.11	0.16	0.01	0.03	<mdl	69	616980
	0.86	12	14	141	3.3	24789	4.8	14	2.5	14	3.6	0.54	2.4	0.19	0.67	1.7	0.10	0.16	0.01	<mdl	0.01	45	598357
	-	-	11	191	3.8	22278	4.6	13	2.4	14	2.6	0.51	1.7	0.14	0.49	1.5	0.07	0.10	0.01	0.04	0.01	42	610915
	<mdl	19	11	171	3.2	19973	4.1	13	2.5	15	3.3	0.52	1.9	0.14	0.51	1.1	0.04	0.05	0.01	0.03	0.01	41	618776
	0.70	18	7.8	203	2.8	19708	3.6	11	1.9	11	2.7	0.52	1.9	0.12	0.34	0.89	0.03	0.05	0.01	0.03	0.01	34	634254
	0.57	9.0	7.9	239	4.1	18354	3.6	11	1.9	11	2.5	0.5	1.3	0.09	0.3	0.63	0.03	0.07	0.01	<mdl	<mdl	33	646526
	0.55	8.0	11	167	2.9	17250	4.0	11	2.0	11	2.4	0.4	1.9	0.14	0.47	1.3	0.06	0.09	0.01	0.04	0.01	34	637567
	0.55	18	6.4	282	2.7	8193	2.3	5.2	0.81	3.6	0.90	0.61	0.63	0.07	0.30	1.0	0.03	0.08	0.01	0.04	0.01	16	652474
	0.79	15	7.4	147	2.7	8094	2.0	6.2	1.3	7.5	2.4	0.52	1.9	0.12	0.30	0.67	0.03	0.04	<mdl	0.03	0.01	23	658904
	0.53	15	6.5	181	2.7	5673	1.4	4.4	0.87	5.5	1.8	0.31	1.3	0.09	0.22	0.42	0.02	0.03	<mdl	0.03	0.01	16	653484
Mean	0.67	14	13	172	3.9	19875	4.6	13	2.4	14	3.1	0.49	2.1	0.16	0.53	1.3	0.07	0.10	0.01	0.04	0.01	42	626727
SD	0.20	3.7	6.3	47	1.2	8268	2.2	6.4	1.1	6.7	1.2	0.07	0.86	0.07	0.24	0.66	0.04	0.06	0.00	0.01	0.00	19	21550
Maximum	1.1	19	23	282	6.2	29485	8.3	24	4.2	25	5.2	0.61	3.7	0.31	1.0	2.8	0.16	0.25	0.02	0.06	0.01	76	658904
Minimum	<mdl	8.0	6.4	124	2.7	5673	1.4	4.4	0.81	3.6	0.90	0.31	0.63	0.07	0.22	0.42	0.02	0.03	<mdl	<mdl	<mdl	16	597184
Powellite-dominant (n=9)	2.6	19	37	106	5.3	109489	16	44	7.1	36	5.0	0.42	2.8	0.20	0.50	1.1	0.06	0.08	0.01	<mdl	0.01	114	430934
	2.1	8.0	23	141	4.2	105479	12	34	5.7	29	3.8	0.45	1.6	0.10	0.25	0.60	0.02	0.05	0.01	0.03	<mdl	88	445679
	2.0	21	30	131	5.1	102291	14	38	6.2	30	4.4	0.39	2.1	0.13	0.40	0.83	0.04	0.06	0.01	<mdl	0.01	96	458304
	2.0	19	20	167	4.2	98798	10	30	5.1	26	3.4	0.41	1.4	0.08	0.28	0.60	0.03	0.07	<mdl	<mdl	<mdl	78	456209
	2.5	18	34	127	5.1	98643	16	41	6.7	32	4.4	0.38	2.2	0.12	0.37	0.79	0.04	0.07	0.01	<mdl	<mdl	105	464561

	2.3	15	25	117	5.1	95419	12	35	5.8	28	3.8	0.36	1.6	0.10	0.33	0.69	0.05	0.04	0.01	<mdl	0.01	88	462988
	2.3	8.0	18	125	3.5	90334	10	26	4.2	21	2.8	0.36	1.3	0.08	0.34	0.59	0.03	0.07	0.01	0.03	<mdl	66	486941
	2.6	-	21	158	3.5	78853	11	28	4.5	23	3.5	0.46	2.0	0.15	0.55	1.1	0.06	0.13	0.01	0.03	0.01	74	491828
	1.5	11	24	125	3.4	74484	13	30	4.6	22	3.1	0.23	1.9	0.16	0.53	1.5	0.07	0.12	0.01	0.04	0.01	77	491637
Mean	2.2	15	26	133	4.4	94866	13	34	5.5	27	3.8	0.38	1.9	0.12	0.39	0.87	0.04	0.08	0.01	0.03	0.01	87	465453
SD	0.36	5.2	6.5	19	0.79	11747	2.3	6.1	1.0	5.0	0.70	0.07	0.47	0.04	0.11	0.31	0.02	0.03	0.00	0.01	0.00	16	21122
Maximum	2.6	21	37	167	5.3	109489	16	44	7.1	36	5.0	0.46	2.8	0.20	0.55	1.5	0.07	0.13	0.01	0.04	0.01	114	491828
Minimum	1.5	8.0	18	106	3.4	74484	10	26	4.2	21	2.8	0.23	1.3	0.08	0.25	0.59	0.02	0.04	<mdl	<mdl	<mdl	66	430934
	-	-	13	-	3.0	56319	5.6	17	3.2	17	2.7	0.49	1.3	0.09	0.37	1.2	0.04	0.08	0.01	0.03	0.01	49	490079
	1.4	18	19	135	5.4	54071	12	35	5.3	27	5.5	0.63	4.3	0.29	1.1	2.6	0.14	0.23	0.02	0.08	0.01	93	555309
	1.5	-	19	192	4.0	50743	7.6	21	3.6	19	3.3	0.44	2.1	0.15	0.48	1.3	0.06	0.12	0.01	0.04	0.01	59	547218
Intermediate	1.2	16	18	137	3.5	48411	8.1	21	3.6	18	3.2	0.40	1.9	0.13	0.54	1.7	0.06	0.16	0.01	0.05	0.01	59	572236
scheelite-	1.2	22	19	130	4.3	48040	7.8	22	3.9	22	4.3	0.46	2.6	0.16	0.60	1.4	0.07	0.09	0.01	0.05	0.01	66	547296
powellite	1.5	18	14	125	6.4	41751	5.3	16	3.0	18	3.5	0.56	2.1	0.13	0.44	0.81	0.04	0.06	0.01	<mdl	0.01	50	568708
(n=10)	1.2	14	21	138	4.9	39332	7.1	21	3.7	21	3.9	0.48	2.5	0.17	0.68	1.5	0.09	0.13	0.01	0.04	0.01	62	573655
	1.3	14	17	150	3.9	36293	6.4	18	3.1	18	3.6	0.6	2.3	0.20	0.60	1.6	0.07	0.15	0.01	0.04	0.01	54	597006
	1.3	-	11	194	4.0	31615	5.8	16	2.8	15	3.0	0.44	1.8	0.14	0.43	1.2	0.05	0.14	0.01	0.03	0.01	47	588313
	0.68	15	21	128	5.9	30518	7.2	22	4.2	25	5.2	0.51	3.8	0.28	0.95	2.1	0.07	0.19	0.01	0.04	0.01	72	609128
Mean	1.3	17	17	148	4.5	43709	7.3	21	3.6	20	3.8	0.50	2.5	0.17	0.62	1.5	0.07	0.14	0.01	0.04	0.01	61	564895
SD	0.25	2.9	3.4	27	1.1	9159	1.9	5.5	0.73	3.7	0.92	0.07	0.92	0.07	0.24	0.51	0.03	0.05	0.00	0.02	0.00	14	33321
Maximum	1.5	22	21	194	6.4	56319	12	35	5.3	27	5.5	0.63	4.3	0.29	1.1	2.6	0.14	0.23	0.02	0.08	0.01	93	609128
Minimum	0.68	14	11	125	3.0	30518	5.3	16	2.8	15	2.7	0.40	1.3	0.09	0.37	0.81	0.04	0.06	0.01	<mdl	0.01	47	490079

Note: -, affected by mineral inclusions; <mld, below minimum detection limit. Average minimum detection limits (mdl), in ppm, were: Ti (0.485), Fe (7.621), As (0.302), Sr (0.017), Nb (0.010), La (0.007), Ce (0.008), Pr (0.006), Nd (0.030), Sm (0.041), Eu (0.011), Gd (0.039), Tb (0.006), Dy (0.023), Y (0.007), Ho (0.006), Er (0.018), Tm (0.005), Yb (0.025), and Lu (0.006).

Supplementary Material Figure S1. LA-ICP-MS element maps of scheelite-powellite for selected elements.



Note: Colour scales in parts-per-million. The images shown left from top to bottom are reflected light, BSE and CL images, respectively, of the mapped area.