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Two new minerals, badengzhuite, TiP, and zhiqinite, $TiSi_2$, from the Cr-11 chromitite orebody, Luobusa ophiolite, Tibet, China: is this evidence for super-reduced mantle-derived fluids?

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Supplementary Materials

Two new minerals, badengzhuite, TiP, and zhiqinite, TiSi2, from the Cr-11 chromitite orebody, Luobusa ophiolite, Tibet, China: Evidence for super-reduced mantle-derived fluids?

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Tables

Figures

Table S1. X-ray powder diffraction data obtained by simulation for badengzhuite (Cu$K\alpha_1$ radiation)

I/rel	*2θ* (°)	*d* (Å)	*h*	*k*	*l*
14.33	29.53	3.022	1	0	0
5.70	30.38	2.940	0	0	4
25.92	30.51	2.927	1	0	1
31.15	33.30	2.688	1	0	2
100.00	37.55	2.394	1	0	3
33.33	42.88	2.107	1	0	4
0.25	46.28	1.960	0	0	6
25.51	49.04	1.856	1	0	5
43.91	52.39	1.745	1	1	0
0.32	54.83	1.673	1	1	2
7.22	55.86	1.644	1	0	6
1.14	61.29	1.511	2	0	0
4.48	61.77	1.501	1	1	4
2.97	61.85	1.499	2	0	1
6.46	63.20	1.470	0	0	8
5.00	63.28	1.468	1	0	7
2.29	63.51	1.464	2	0	2
10.92	66.23	1.410	2	0	3
5.15	69.94	1.344	2	0	4
1.10	71.28	1.322	1	0	8
0.17	72.46	1.303	1	1	6
4.35	74.58	1.271	2	0	5
0.41	79.92	1.199	1	0	9
1.48	80.13	1.197	2	0	6
0.15	81.84	1.176	0	0	10
0.62	84.80	1.142	2	1	0
2.01	85.29	1.137	2	1	1
10.62	86.50	1.124	1	1	8
1.69	86.57	1.124	2	0	7
1.10	86.77	1.121	2	1	2
6.51	89.23	1.097	2	1	3
0.19	89.31	1.096	1	0	10

Note: Pattern is shown in Figure S4a.

Table S2. X-ray powder diffraction data obtained by simulation for zhiqinite (Cu$K\alpha_1$ radiation)

I/rel	*2θ* (°)	*d* (Å)	*h*	*k*	*l*
8.77	24.02	3.702	1	1	1
30.54	30.43	2.935	2	0	2
2.72	38.50	2.337	1	1	3
100.00	39.76	2.265	3	1	1
42.72	42.40	2.130	0	0	4
77.64	43.45	2.081	0	2	2
8.81	44.03	2.055	2	2	0
0.01	44.72	2.025	4	0	0
0.00	49.18	1.851	2	2	2
38.69	50.36	1.810	3	1	3
0.60	58.60	1.574	1	1	5
0.53	60.25	1.535	1	3	1
5.50	61.36	1.510	5	1	1
3.95	62.78	1.479	2	2	4
0.02	63.32	1.468	4	0	4
0.04	64.11	1.451	4	2	2
9.62	67.89	1.379	3	1	5
0.31	68.57	1.367	1	3	3
8.61	69.42	1.353	3	3	1
3.01	69.60	1.350	5	1	3
1.18	70.18	1.340	2	0	6
4.96	73.53	1.287	6	0	2
0.00	76.09	1.250	4	2	4
5.04	77.25	1.234	3	3	3
5.13	78.30	1.220	0	2	6
2.24	80.47	1.192	0	4	0
2.91	81.94	1.175	6	2	0
0.00	82.50	1.168	2	2	6
0.15	82.61	1.167	1	1	7
0.14	84.04	1.151	1	3	5
1.16	85.01	1.140	5	1	5
0.00	85.71	1.133	6	2	2
1.08	86.44	1.125	5	3	1
0.00	87.41	1.115	7	1	1
0.85	88.41	1.105	2	4	2

Note: Pattern is shown in Figure S4b.

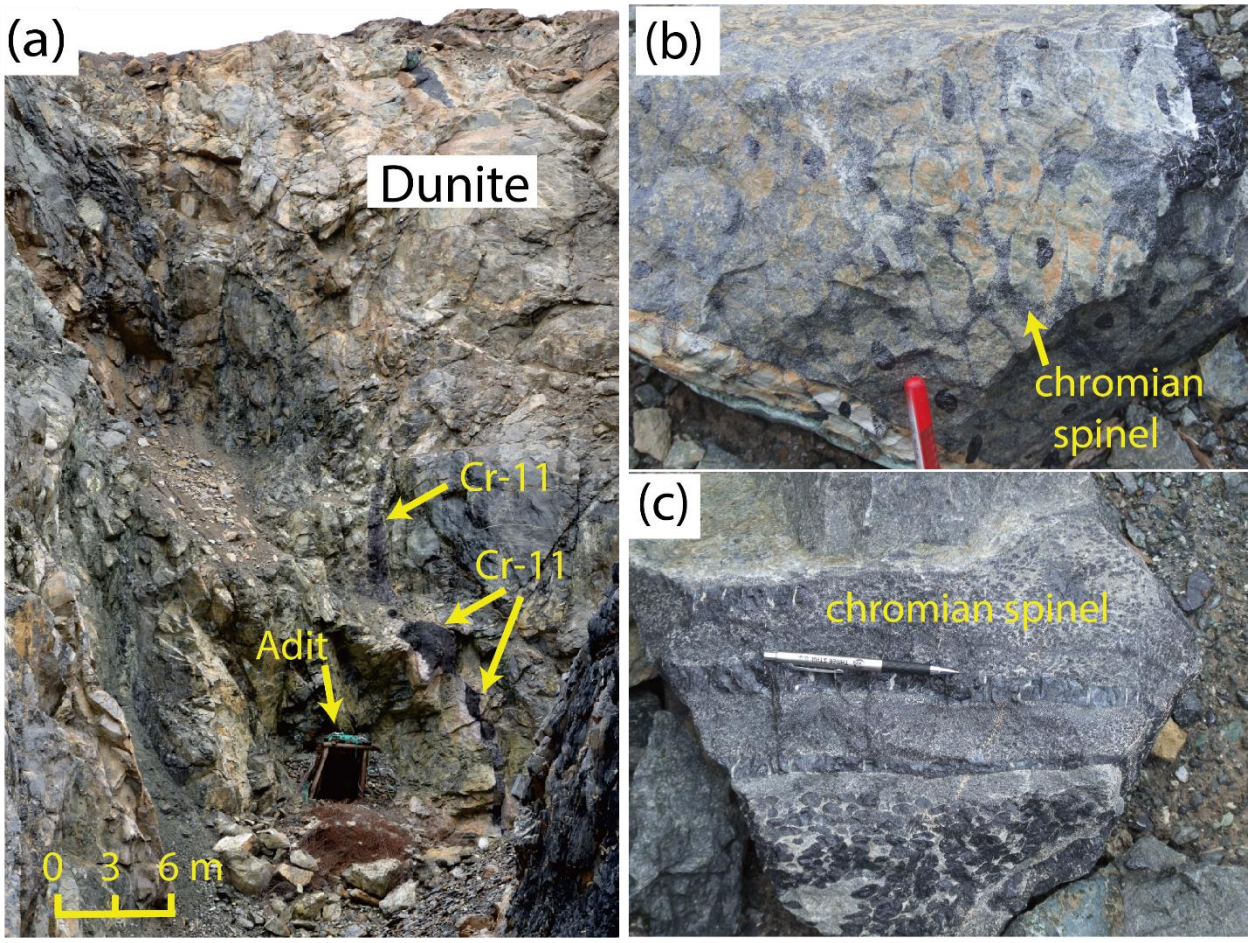

Figure S1. (a) Exposure showing the Cr-11 chromitite orebody from which badengzhuite and zhiqinite were recovered. Lenses of the chromitite are enveloped by dunite. (b) disseminated chromian spinel with olivine in dunite, (c) Moderately disseminated chromian spinel in layer contacting with nodular material.

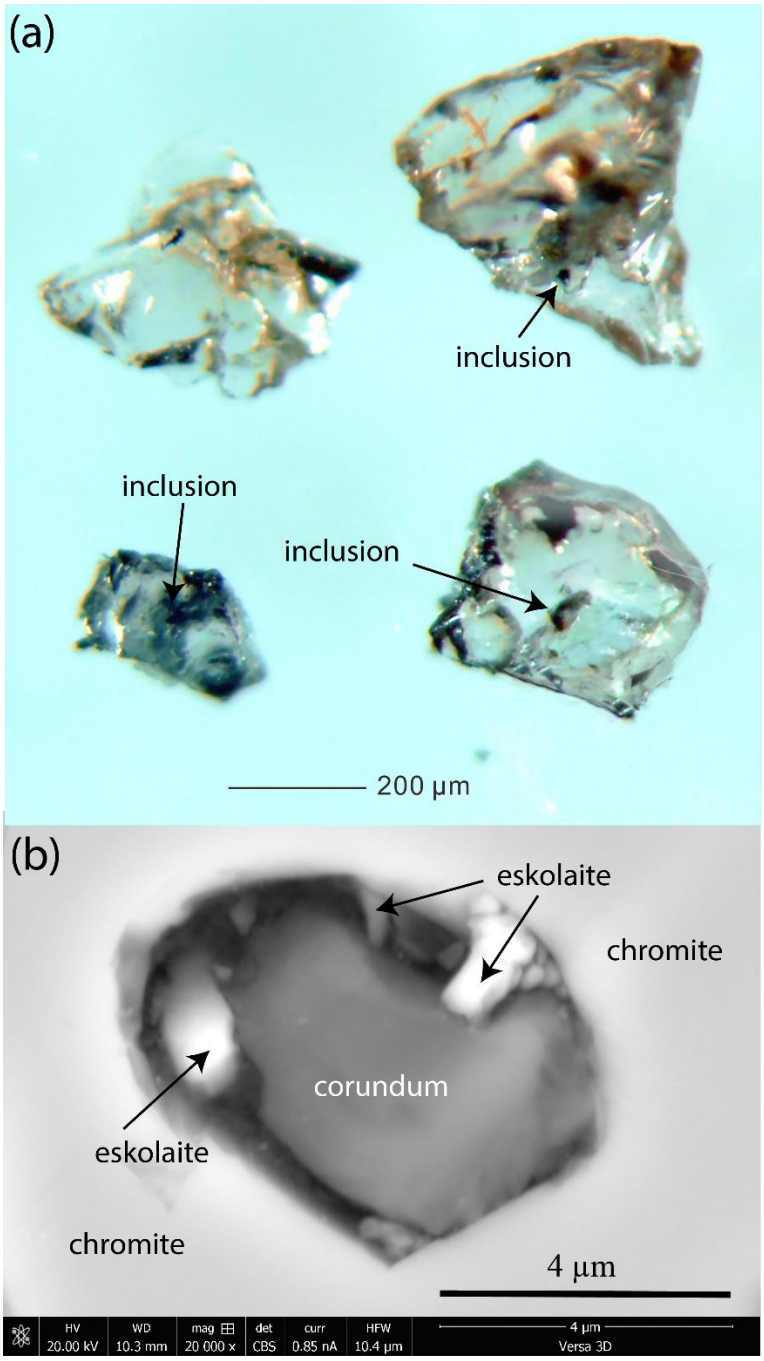

Figure S2. (a) Photograph of corundum grains with inclusions recovered from the Cr-11 chromitite orebody, Luobusa ophiolite. (b) Backscattered electron image of corundum and eskolaite surrounded by chromite. Image taken at the Center for Advanced Research on the Mantle.

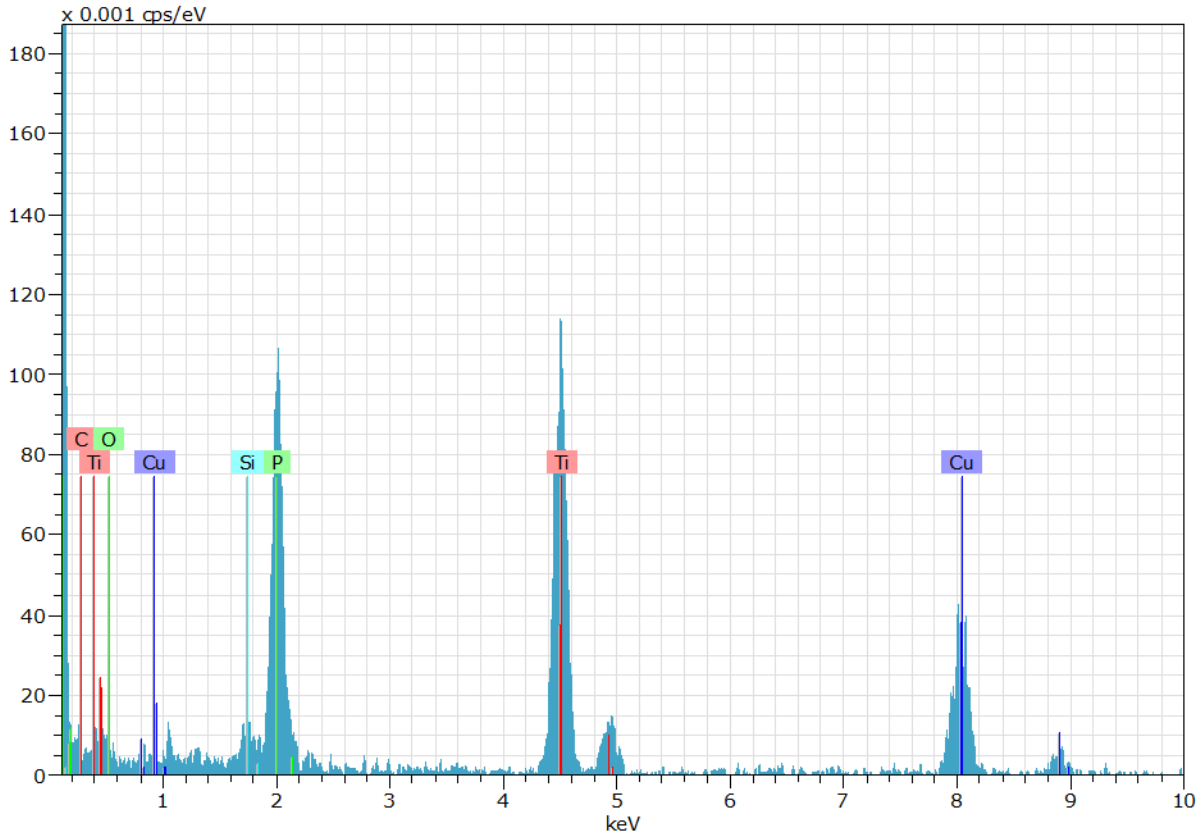

Figure S3. EDX spectra for badengzhuite at point #426 in foil #5358 obtained at the Istituto Italiano di Tecnologia (IIT), Center for Nanotechnology Innovation@NEST.

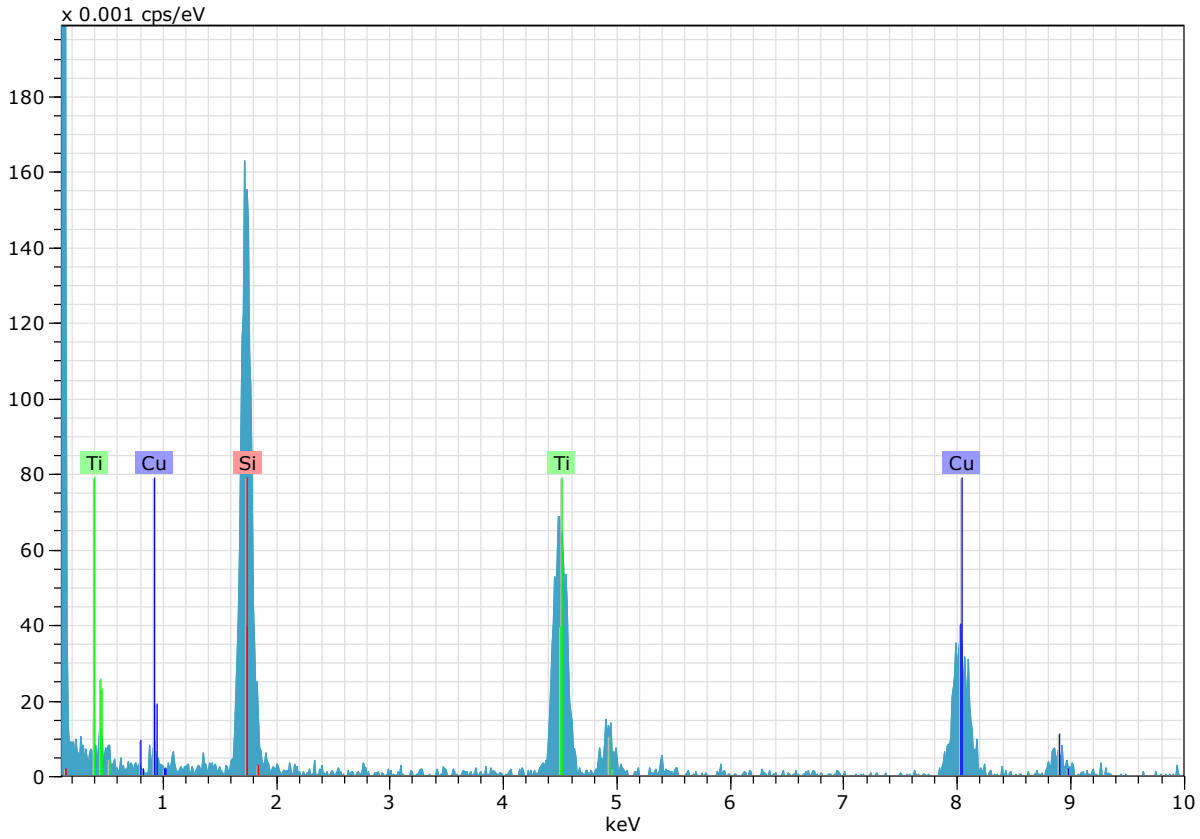

Figure S4. EDX spectra for zhiqinite at point #428 in foil #5358 obtained at the Istituto Italiano di Tecnologia (IIT), Center for Nanotechnology Innovation@NEST.

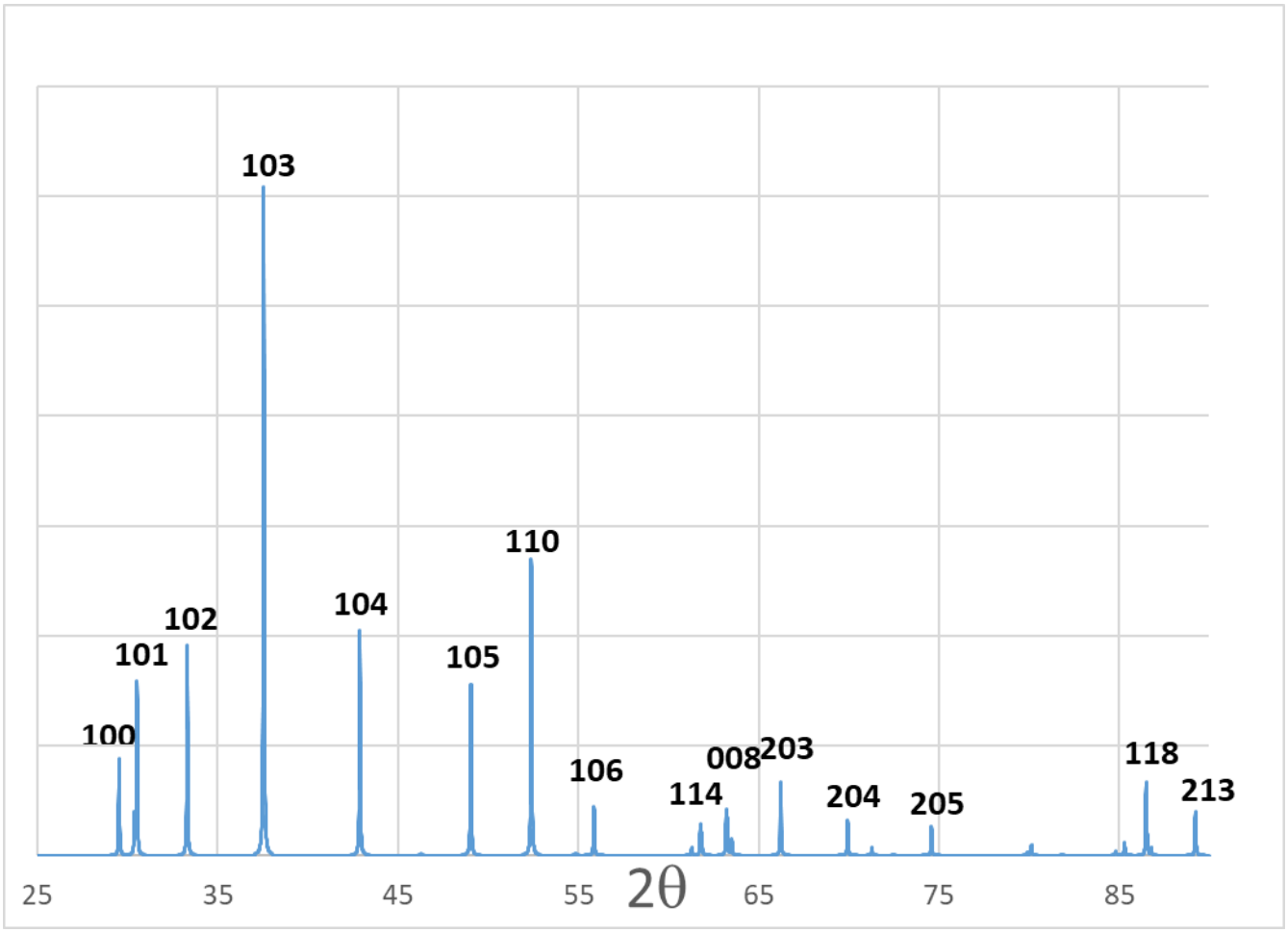

Figure S5. Simulated powder X-ray diffraction pattern for badengzhuite with Cu$K\alpha_1$ radiation.

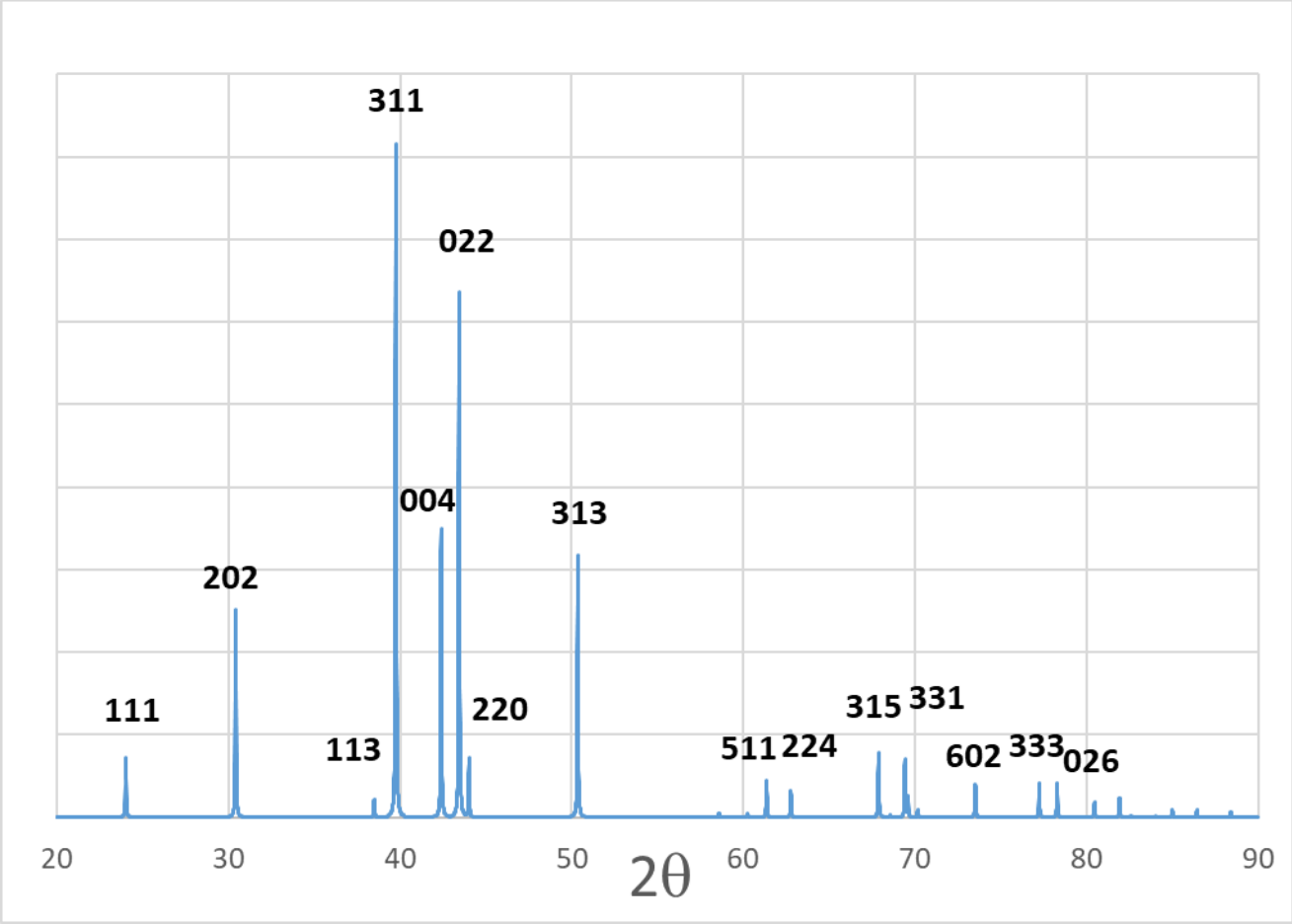

Figure S6. Simulated powder X-ray diffraction pattern for zhiqinite with Cu$K\alpha_1$ radiation.