

Supplementary Data

to the article

**Transjordanite, Ni_2P , a new terrestrial and meteoritic phosphide, and natural solid solutions
barringerite-transjordanite (hexagonal Fe_2P - Ni_2P)**

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Table S1. Chemical composition (wt. %) of some minerals associated with terrestrial transjordanite (Fig. 1).

	Diopside	Trevorite	Merrillite	Ca-Mo-O	UN1	UN2	UN3	UN4	UN5	UN6
CaO	25.93	-	44.58	27.13	13.75	35.71	3.71	1.92	0.97	30.46
MgO	18.02	-	2.35	0.28	1.28	1.04	1.76	20.83	-	0.25
CoO	-	-	-	-	-	-	-	-	1.11	-
NiO	-	30.76	1.50	6.82	5.23	12.73	16.07	1.37	38.88	-
CuO	-	1.11	-	-	-	-	-	-	-	-
Al₂O₃	1.87	0.83	-	-	4.18	-	-	3.36	0.60	3.63
V₂O₃	-	-	-	-	-	-	0.69	-	0.93	0.59
Cr₂O₃	-	2.22	-	-	-	-	-	-	0.89	-
Fe₂O₃	0.55	65.37	2.69	0.84	21.42	-	26.52	2.24	14.74	13.11
TiO₂	-	-	-	-	-	-	-	-	0.92	-
SiO₂	54.09	-	0.89	2.76	28.71	9.61	1.39	54.55	18.21	27.34
P₂O₅	-	-	44.85	4.17	5.57	26.37	48.55	-	-	10.77
SO₃	-	-	3.56	-	0.62	0.77	0.52	-	1.92	1.50
MoO₃	-	-	-	42.88	-	-	-	-	-	-
Total	100.46	100.29	100.42	84.88	80.76	86.23	99.21	84.27	79.17	87.65

Formula amounts of cations (calculated on the given number of oxygen atoms)

Oxygen #	6	4	28	18	8	11	14	8	10	8
Ca	1.00	-	8.35	5.03	0.96	3.32	0.35	0.11	0.11	1.92
Mg	0.97	-	0.61	0.07	0.12	0.13	0.23	1.64	-	0.02
Co	-	-	-	-	-	-	-	-	0.09	-
Ni	-	0.96	0.21	0.95	0.27	0.89	1.15	0.06	3.29	-
Cu	-	0.03	-	-	-	-	-	-	-	-
Al	0.08	0.04	-	-	0.32	-	-	0.21	0.07	0.25
V	-	-	-	-	-	-	0.05	-	0.08	0.03
Cr	-	0.07	-	-	-	-	-	-	0.07	-
Fe	0.01	1.90	0.35	0.11	1.05	-	1.78	0.09	1.17	0.58
Ti	-	-	-	-	-	-	-	-	0.07	-
Si	1.95	-	0.16	0.48	1.87	0.83	0.12	2.88	1.91	1.61
P	-	-	6.64	0.61	0.31	1.94	3.67	-	-	0.54
S	-	-	0.47	-	0.03	0.05	0.03	-	0.15	0.07
Mo	-	-	-	3.10	-	-	-	-	-	-
Σ cations	4.01	3.00	16.79	10.35	4.93	7.16	7.38	4.99	7.01	5.02

Table S2. Powder X-ray diffraction data for transjordanite (*d* values in Å)

Transjordan Plateau (holotype)				Nahal Halamish, Israel ^a			Cambria meteorite			
<i>I</i> _{meas}	<i>d</i> _{meas}	<i>I</i> _{calc}	<i>d</i> _{calc}	<i>I</i> _{meas}	<i>d</i> _{meas}	<i>d</i> _{calc}	<i>I</i> _{meas}	<i>d</i> _{meas}	<i>d</i> _{calc}	<i>hkl</i>
1	5.09	2	5.10	3	5.10	5.09			5.07	100
1	3.358	1	3.352	2	3.387	3.384			3.442	001
2	2.941	4	2.942	6	2.937	2.937			2.926	110
2	2.803	2	2.800	4	2.819	2.817			2.847	101
2	2.550	1	2.548	3	2.543	2.543			2.534	200
100	2.211	100	2.211	100	2.218	2.218	100	2.228	2.229	111
42	2.028	51	2.028	53	2.033	2.033	33	2.039	2.040	201
37	1.926	38	1.926	30	1.922	1.923	19	1.915	1.915	210
21	1.697	23	1.699	25	1.693	1.694	16	1.688	1.689	300
18	1.676	19	1.676			1.692	16	1.721	1.721	002
18	1.672	14	1.670	10	1.671	1.672	10	1.673	1.674	211
4	1.455	1	1.456	1	1.467	1.466	12	1.485	1.483	112
6	1.413	6	1.413	3	1.410	1.411	2	1.405	1.405	310
3	1.347	3	1.347	1	1.347	1.347	3	1.346	1.346	221
10	1.302	8	1.302	3	1.302	1.302	3	1.301	1.301	311
5	1.274	2	1.274			1.272			1.267	400
15	1.264	17	1.264	7	1.270	1.270	6	1.280	1.280	212
15	1.192	15	1.193	4	1.197	1.198	3	1.205	1.205	302
		4	1.191	1	1.190	1.190				401
3	1.169	3	1.169	1	1.167	1.167				320
4	1.111	2	1.112	1	1.109	1.110				410
20	1.1035	22	1.1039	5	1.1028	1.1032				321
6	1.0800	6	1.0804	1	1.0832	1.0835				312
5	1.0556	3	1.0555			1.0547				411
8	1.0432	10	1.0444	2	1.0530	1.0529				113
6	1.0226	7	1.0232	1	1.0308	1.0311				203
6	1.0193	3	1.0192			1.0173				500
4	1.0138	3	1.0142	1	1.0164	1.0165				402
4	0.9806	2	0.9808	1	0.9786	0.9789				330
8	0.9746	8	0.9751	1	0.9734	0.9742				501
3	0.9659	5	0.9664			0.9729				213
7	0.9629	7	0.9631			0.9613				420
7	0.9584	6	0.9588	1	0.9606	0.9606				322

^a Data for a grain H01 (Table 1) depicted on Fig. 1D.

Table S3. Reflectance values R (%) for holotype transjordanite

R_{\max}/R_{\min}	λ (nm)	R_{\max}/R_{\min}	λ (nm)
41.0/40.2	400	50.7/49.1	560
42.2/41.1	420	51.6/49.9	580
43.2/42.4	440	52.1/50.3	589 ^a
44.5/43.5	460	52.6/50.8	600
45.1/44.2	470 ^a	53.4/51.4	620
45.7/44.8	480	54.0/51.9	640
47.1/46.1	500	54.3/52.1	650 ^a
48.3/47.3	520	54.5/52.3	660
49.6/48.3	540	55.0/52.6	680
49.9/48.5	546 ^a	55.5/53.0	700

^a Reflectance values for four wavelengths recommended by the Commission on Ore Mineralogy, I.M.A.

Table S4. Unit-cell parameters and calculated density (g/cm³) for studied transjordanite-barringerite series minerals and synthetic reference samples ^a

	Ni (<i>apfu</i>)	<i>a</i> (Å)	<i>c</i> (Å)	<i>V</i> (Å ³)	<i>D</i> _{calc}
Ni ₂ P ^b	2.00	5.867	3.389	100.03	7.31
H01	1.97	5.8734	3.3838	101.091	7.32
H02	1.85	5.8807	3.3617	100.681	7.34
T03	1.71	5.8845	3.3516	100.508	7.34
H04	1.55 ^c	5.8775	3.3702	100.826	7.28
H05	1.32 ^c	5.8704	3.3774	100.797	7.33
H06	1.19 ^c	5.8554	3.4140	101.369	7.29
Ollague ^d	1.16	5.87(7)	3.44(4)	102.7	7.07
FeNiP ^b	1.00	5.844	3.434	101.56	7.14
T07	0.72	5.8438	3.4644	102.459	7.27
H08	0.44	5.8474	3.4707	102.772	7.14
Cambria	0.81 ^e	5.8514	3.4418	102.053	
H09	0.31 ^c	5.8548	3.4692	102.987	7.04
H10	0.30	5.8570	3.4671	103.002	6.97
H11	0.23	5.8619	3.4654	103.124	7.01
T12	0.04	5.8676	3.4624	103.235	6.93
Fe ₂ P ^b	0.00	5.867	3.457	103.05	6.90

^a Sample numbers according to Table 1. Estimated standard deviations for the minerals: *a* ~0.0002 Å, *c* ~0.0001 Å, *V* ~0.006 Å³. ^b Data for synthetic Ni₂P, FeNiP and Fe₂P: Fruchart et al. (1969). ^c Contains Mo (see Table 1). ^d Holotype barringerite (Buseck 1969). ^e Estimated Ni content in an averaged powder sample.