

Table S1. Average concentrations of components in solid phases and in the melt and distribution coefficients of components between the phases and melt.

g	Solid phase composition, mol.% ¹				Melt composition, mol.% ²				κ (solid/L) ²			
	Fe	Ni	Cu	S	Fe	Ni	Cu	S	Fe	Ni	Cu	S
Zone I – mss ($0 \leq g \leq 0.30$)												
0.00	40.54±0.08 ³	1.89±0.01	4.38±0.06	53.19±0.01	32.06	1.71	15.80	50.43	1.26	1.11	0.28	1.05
0.09	40.36±0.21	1.92±0.05	4.66±0.11	53.06±0.01	31.02	1.68	17.19	50.11	1.30	1.14	0.27	1.06
0.14	40.25±0.16	1.93±0.01	4.83±0.02	52.99±0.13	30.41	1.67	18.01	49.92	1.32	1.16	0.27	1.06
0.15	40.23±0.13	1.93±0.04	4.86±0.16	52.98±0.01	30.28	1.66	18.18	49.88	1.33	1.16	0.27	1.06
0.23	40.06±0.08	1.96±0.01	5.12±0.19	52.86±0.08	29.36	1.64	19.38	49.61	1.37	1.20	0.26	1.07
0.30	39.86±0.01	2.05±0.11	5.22±0.11	52.87±0.26	28.51	1.62	20.53	49.34	1.41	1.27	0.25	1.07
Zone II – icb* ($0.30 \leq g \leq 0.32$)												
0.32	30.59±0.42	0.86±0.11	17.96±0.16	50.58±0.19	28.27	1.62	20.85	49.26	1.08	0.53	0.86	1.03
Zone III – iss₁ ($0.32 \leq g \leq 0.87$)												
0.38	27.62±0.19	1.65±0.11	20.90±0.21	49.83±0.15	28.31	1.63	20.91	49.15	0.98	1.01	1.00	1.01
0.46	27.77±0.28	1.63±0.20	20.80±0.33	49.80±0.19	28.42	1.61	20.83	49.13	0.98	1.01	1.00	1.01
0.47	27.80±0.31	1.63±0.16	20.78±0.23	49.80±0.01	28.44	1.61	20.82	49.12	0.98	1.01	1.00	1.01
0.55	27.95±0.22	1.61±0.10	20.68±0.27	49.77±0.08	28.54	1.61	20.84	49.01	0.98	1.00	0.99	1.02
0.62	28.08±0.29	1.59±0.16	20.59±0.21	49.74±0.08	28.62	1.62	20.91	48.84	0.98	0.98	0.98	1.02
0.68	28.20±0.11	1.57±0.11	20.51±0.08	49.72±0.08	28.69	1.64	21.03	48.63	0.98	0.96	0.98	1.02
0.81	28.44±0.11	1.54±0.01	20.34±0.13	49.67±0.11	28.82	1.70	21.43	48.04	0.99	0.92	0.94	1.03
0.87	28.57±0.12	1.52±0.01	20.26±0.11	49.65±0.01	28.88	1.74	21.71	47.67	0.99	0.87	0.93	1.04
Zone IV – iss₂ ($0.87 \leq g \leq 0.96$)												
0.92	25.44±0.16	1.51±0.05	24.00±0.07	49.04±0.01	30.95	1.91	20.91	46.22	0.82	0.79	1.15	1.06
0.96	25.25±0.15	1.38±0.03	24.32±0.18	49.05±0.08	36.91	2.47	17.35	43.27	0.68	0.56	1.40	1.13

¹ – experimental data, ² – calculated data, ³ ± - 1 standard deviation.

Table S2. Representative SEM/EDS analyses of microminerals.

Mineral	Formulae	Total	Fe	Ni	Cu	Au	Ag	Pt	Pd	Bi	Sb	Te	As	Se	S
Zone I (mss) ¹															
Merenskyite	PdTe ₂	98.27 ²	2.28	<LOD ³	1.45	<LOD	<LOD	<LOD	27.72	2.25	<LOD	63.34	<LOD	<LOD	1.23
			4.69	<LOD	2.62	<LOD	<LOD	<LOD	29.96	1.24	<LOD	57.08	<LOD	<LOD	4.41
Moncheite	(Pt,Pd)Te ₂	99.72	0.94	<LOD	1.43	<LOD	<LOD	31.43	8.15	<LOD	<LOD	57.44	<LOD	0.33	<LOD
			2.3	<LOD	3.08	<LOD	<LOD	22.03	10.47	<LOD	<LOD	61.55	<LOD	0.57	<LOD
Platarsite	PtRhAsS	96.39	14.71	0.35	8.38	<LOD	<LOD	18.70	<LOD	1.02	10.73	<LOD	<LOD	20.29	22.22
			16.72	0.38	8.37	<LOD	<LOD	6.08	<LOD	0.64	6.62	<LOD	<LOD	17.19	44.00
Nevskite	Bi(Se,S)	99.38	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	70.71	3.33	7.02	<LOD	9.12	3.82
			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	45.73	3.70	7.43	<LOD	15.62	16.09
Naumannite	Ag ₂ Se	98.62	1.59	<LOD	0.94	<LOD	68.08	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	27.25	0.76
			2.73	<LOD	1.42	<LOD	60.50	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	33.08	2.27
Tsumoite	BiTe	100.18	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	64.72	<LOD	31.56	<LOD	3.90	<LOD
			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	51.07	<LOD	40.79	<LOD	8.14	<LOD
Au-Ag-Cu alloy	Au**	99.92	<LOD	<LOD	2.52	93.28	4.12	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	7.19	85.89	6.92	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zones II-V (Fe-Cu sulfides)															
Sperrylite ⁴	PtAs ₂	102.61	1.37	0.95	2.05	<LOD	<LOD	53.86	1.63	<LOD	1.99	0.58	34.67	<LOD	5.51
			2.41	1.59	3.16	<LOD	<LOD	27.07	2.41	<LOD	1.6	0.45	45.37	<LOD	16.85
Class I															
Pd-Bi-Sb-Te	Pd(Bi,Sb) _x Te _{1-x}	103.88	0.72	0.94	1.03	6.26	1.28	1.28	24.81	32.39	10.76	24.1	0.31	<LOD	<LOD
			1.69	2.09	2.12	4.16	1.55	0.86	30.49	20.26	11.55	24.69	0.54	<LOD	<LOD
Pd-Sb-Bi-Te	Pd(Sb,Bi) _x Te _{1-x}	98.47	1.03	1.76	1.14	12.85	2.5	<LOD	29.04	18.37	23.79	7.99	<LOD	<LOD	<LOD
			2.38	3.88	2.32	8.43	3.00	<LOD	35.28	11.36	25.26	8.09	<LOD	<LOD	<LOD
Au-Ag-Cu-Pd alloy	Au*	98.64	<LOD	<LOD	1.58	84.07	9.73	<LOD	3.26	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	4.34	74.57	15.75	<LOD	5.34	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Au-Ag-Cu alloy	Au**	102.33	<LOD	<LOD	2.19	96.69	3.45	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	6.18	88.1	5.72	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Class II															

Au-Ag-Cu alloy	Au*	96.28	<LOD	<LOD	1.52	84.05	10.71	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	4.35	77.60	18.05	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Au-Ag-Cu-Pd alloy	Au**	99.25	<LOD	<LOD	1.43	95.45	1.93	<LOD	0.44	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	4.25	91.58	3.39	<LOD	0.78	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hessite	Ag ₂ Te	104.63	0.26	<LOD	1.18	1.3	64.5	<LOD	<LOD	<LOD	<LOD	36.25	<LOD	<LOD	<LOD
			0.51	<LOD	2.02	0.72	65.15	<LOD	<LOD	<LOD	<LOD	30.96	<LOD	<LOD	<LOD
Nevskite	(Bi,Se)S	101.09	1.27	1.26	2.78	<LOD	0.76	1.71	<LOD	69.12	0.69	7.25	<LOD	11.21	5.04
			2.87	2.70	5.49	<LOD	0.88	1.09	<LOD	41.53	0.71	7.13	<LOD	17.83	19.76
Bismuth	Bi	101.96	1.49	0.27	3.49	1.23	<LOD	<LOD	<LOD	93.19	1.19	0.65	<LOD	0.45	<LOD
			4.77	0.81	9.82	1.12	<LOD	<LOD	<LOD	79.80	1.75	0.92	<LOD	1.02	<LOD
Wttichenite	Cu ₃ BiS ₃	99.75	1.39	<LOD	36.5	<LOD	2.07	<LOD	<LOD	37.06	2.35	0.86	<LOD	2.25	17.26
			1.79	<LOD	41.36	<LOD	1.38	<LOD	<LOD	12.77	1.39	0.49	<LOD	2.05	38.77
Stibio-wittichenite	Cu ₃ SbS ₃	99.52	6.85	0.63	37.09	<LOD	0.43	<LOD	<LOD	4.23	25.58	<LOD	0.56	0.42	23.72
			7.20	0.63	34.25	<LOD	0.23	<LOD	<LOD	1.19	12.33	<LOD	0.44	0.31	43.42
Parkerite	Ni ₃ Bi ₂ S ₂	101.94	8.12	33.05	8.73	<LOD	0.80	<LOD	<LOD	11.11	19.43	<LOD	0.31	0.31	20.09
			8.55	33.11	8.08	<LOD	0.44	<LOD	<LOD	3.13	9.38	<LOD	0.24	0.23	36.85
Tetradymite	Bi ₂ Te ₂ S	102.29	1.03	0.22	1.99	1.25	0.73	1.53	<LOD	56.09	0.85	30.38	<LOD	4.25	3.97
			2.41	0.49	4.09	0.83	0.88	1.02	<LOD	35.06	0.91	31.1	<LOD	7.03	16.17
Class III															
Bismuth	Bi	101.42	0.36	<LOD	1.31	1.55	<LOD	1.80	0.4	96.02	<LOD	<LOD	<LOD	<LOD	<LOD
			1.27	<LOD	4.06	1.55	<LOD	1.82	0.74	90.56	<LOD	<LOD	<LOD	<LOD	<LOD
Tsumoite	BiTe	102.31	1.36	0.23	1.51	<LOD	0.71	1.14	<LOD	63.86	<LOD	32.91	<LOD	0.59	<LOD
			3.83	0.62	3.74	<LOD	1.04	0.92	<LOD	48.09	<LOD	40.59	<LOD	1.18	<LOD
Stibio-wittichenite	Cu ₃ SbS ₃	98.5	6.37	0.38	36.94	<LOD	<LOD	<LOD	<LOD	3.59	26.05	<LOD	1.06	0.34	23.78
			6.74	0.38	34.33	<LOD	<LOD	<LOD	<LOD	1.01	12.64	<LOD	0.84	0.25	43.81
Au-Ag-Cu alloy	Au*	99.16	<LOD	<LOD	2.68	85.99	10.49	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	7.31	75.80	16.89	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Au-Ag-Cu alloy	Au**	100.55	<LOD	<LOD	2.65	96.03	1.87	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
			<LOD	<LOD	7.64	89.19	3.17	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pd-Sb-Bi-Te	Pd(Sb,Bi) _x Te _{1-x}	103.44	<LOD	0.45	<LOD	1.89	<LOD	<LOD	40.57	8.84	30.57	20.7	0.41	<LOD	<LOD

			<LOD	0.89	<LOD	1.12	<LOD	<LOD	44.35	4.92	29.21	18.87	0.64	<LOD	<LOD
Pd-Sb-Bi-Te	$\text{Pd}(\text{Sb,Bi})_x\text{Te}_{1-x}$	100.54	0.76	3.41	2.06	<LOD	1.08	1.70	30.99	6.05	12.1	42.39	<LOD	<LOD	<LOD
			1.56	6.64	3.71	<LOD	1.14	1.00	33.3	3.31	11.36	37.98	<LOD	<LOD	<LOD
Tetradymite	$\text{Bi}_2\text{Te}_2(\text{Se,S})$	98.37	0.68	<LOD	2.13	2.09	1.82	<LOD	1.22	51.39	0.56	29.17	<LOD	6.74	2.56
			1.67	<LOD	4.6	1.46	2.31	<LOD	1.57	33.73	0.63	31.36	<LOD	11.71	10.95
Tetradymite	$\text{Bi}_2\text{Te}_2\text{S}$	100.34	0.73	0.21	2.53	<LOD	4.78	<LOD	<LOD	54.22	1.26	30.59	<LOD	1.17	4.85
			1.68	0.46	5.13	<LOD	5.71	<LOD	<LOD	33.42	1.33	30.88	<LOD	1.91	19.48
Wttichenite	Cu_3BiS_3	98.17	0.23	<LOD	39.63	<LOD	0.35	<LOD	<LOD	29.28	8.05	<LOD	<LOD	1.51	18.57
			0.29	<LOD	43.28	<LOD	0.23	<LOD	<LOD	9.72	4.59	<LOD	<LOD	1.33	40.20
Parkerite	$\text{Ni}_3\text{Bi}_2\text{S}_2$	100.67	1.02	25.19	1.39	1.33	1.08	<LOD	<LOD	59.38	0.93	1.31	<LOD	<LOD	9.02
			1.71	40.13	2.05	0.63	0.94	<LOD	<LOD	26.57	0.71	0.96	<LOD	<LOD	26.31
Sperryllite ⁵	PtAs_2	102.98	1.21	0.89	1.96	<LOD	<LOD	54.78	0.49	2.17	0.77	0.52	31.65	<LOD	8.54
			2.03	1.42	2.90	<LOD	<LOD	26.43	0.44	0.98	0.60	0.38	39.76	<LOD	25.06
Gersdorffite	NiAsS	96.43	2.39	26.76	1.52	<LOD	0.78	<LOD	4.33	1.96	12.86	1.00	26.87	2.16	15.80
			2.72	29.00	1.52	<LOD	0.46	<LOD	2.59	0.60	6.72	0.50	22.81	1.74	31.35
Emplectite	CuBiS_2	102.57	1.95	1.19	17.00	<LOD	1.98	<LOD	<LOD	53.09	7.53	1.45	<LOD	3.00	15.37
			2.94	1.71	22.56	<LOD	1.55	<LOD	<LOD	21.42	5.22	0.96	<LOD	3.21	40.43
Hessite	Ag_2Te	98.05	0.20	<LOD	0.92	4.52	58.5	<LOD	<LOD	<LOD	<LOD	33.07	<LOD	0.84	<LOD
			0.42	<LOD	1.70	2.69	63.57	<LOD	<LOD	<LOD	<LOD	30.38	<LOD	1.25	<LOD
Bornite	Cu_5FeS_4	99.62	10.84	0.34	61.14	<LOD	0.30	<LOD	<LOD	1.39	0.27	<LOD	<LOD	1.00	24.34
			9.98	0.3	49.45	<LOD	0.14	<LOD	<LOD	0.34	0.11	<LOD	<LOD	0.65	39.02

¹ Here the laurite (RuS_2) was analyzed: in wt.% Ru (59.43), Rh (1.30), Pd (0.64), Fe (0.76), S (39.13), Σ (101.26); in mol. % Ru (66.30), Rh (0.69), Pd (0.33), Fe (0.74), S (31.94).

² For each phase, compositions expressed in wt.% are in the first row, in mol. % - in the second row; the content of Ru, Rh and Sn in phases is below LOD.

³ LOD was 0.4–0.5 wt. % for Pt, Au, Bi, and 0.1–0.2 wt. % for the others.

⁴ Single phase inclusions.

⁵ Polyphase intergrowths.

Table S3. EDS results for average composition of the inclusions.

g	Total	Fe	Ni	Cu	Au	Ag	Pt	Pd	Bi	Sb	Te	As	Se	S
Class I														
0.38	96.90	1.15 ¹	2.27	0.64	25.36	4.75	<LOD ²	23.57	12.19	8.19	17.35	1.43	<LOD	<LOD
		2.77	5.19	1.35	17.30	5.91	<LOD	29.76	7.84	9.04	18.27	2.57	<LOD	<LOD
0.46	102.06	0.29	0.83	0.84	22.07	1.68	5.35	20.24	20.28	9.89	18.63	1.96	<LOD	<LOD
		0.73	1.93	1.81	15.39	2.14	3.76	26.12	13.32	11.15	20.04	3.59	<LOD	<LOD
0.68	102.95	0.18	2.62	0.27	28.09	6.83	<LOD	20.43	17.89	13.29	12.97	0.39	<LOD	<LOD
		0.41	5.86	1.75	18.75	8.32	<LOD	25.24	11.26	14.35	13.37	0.69	<LOD	<LOD
0.81	103.48	0.83	1.01	1.14	25.24	3.15	<LOD	27.24	13.51	9.87	19.58	1.23	0.68	<LOD
		1.88	2.19	2.28	16.27	3.7	<LOD	32.50	8.21	10.3	19.48	2.09	1.10	<LOD
0.87	102.65	0.28	0.51	0.92	28.10	2.51	1.68	26.52	16.57	10.70	14.86	<LOD	<LOD	<LOD
		0.70	1.19	1.98	19.39	3.17	1.17	33.86	10.77	11.94	15.83	<LOD	<LOD	<LOD
~1	104.39	0.19	1.14	1.39	28.01	4.96	<LOD	26.35	11.94	9.65	20.15	0.61	<LOD	<LOD
		0.43	2.48	2.79	18.17	5.87	<LOD	31.64	7.30	10.12	20.17	1.03	<LOD	<LOD
Class II														
0.55	102.73	5.62	2.25	24.53	<LOD	0.43	<LOD	<LOD	34.50	13.98	1.52	<LOD	2.59	17.31
		7.22	2.75	27.7	<LOD	0.29	<LOD	<LOD	11.85	8.24	0.85	<LOD	2.35	38.75
0.62	105.73	6.43	4.13	23.79	3.87	2.19	<LOD	<LOD	26.82	16.07	2.3	0.48	1.31	18.34
		7.82	4.78	25.41	1.33	1.38	<LOD	<LOD	8.71	8.96	1.22	0.43	1.13	38.83
0.68	102.25	2.51	0.42	20.18	1.82	1.94	<LOD	<LOD	42.62	10.82	6.79	<LOD	2.24	12.89
		3.82	0.59	27.07	0.79	1.54	<LOD	<LOD	17.38	7.57	4.54	<LOD	2.42	34.28
0.87	103.23	4.81	3.98	22.26	6.05	3.70	1.44	<LOD	24.81	15.59	3.67	<LOD	1.44	16.15
		6.27	4.93	25.49	2.24	2.50	0.54	<LOD	8.64	9.32	2.09	<LOD	1.33	36.64
~1	100.98	5.68	12.35	23.94	<LOD	0.54	3.8	<LOD	27.19	9.66	1.54	0.55	0.74	15.00
		7.17	14.82	26.54	<LOD	0.35	1.37	<LOD	9.17	5.59	0.85	0.52	0.66	32.96

Class III														
0.38	104.16	1.32	1.16	16.87	6.98	3.66	<LOD	14.27	21.58	17.72	8.40	<LOD	0.82	11.38
		1.99	1.65	22.27	2.97	2.84	<LOD	11.25	8.66	12.20	5.52	<LOD	0.87	29.78
0.46	102.17	1.51	2.25	8.08	14.29	6.11	19.05	11.34	10.16	4.29	9.46	13.91	0.44	3.28
		2.80	3.96	13.14	7.45	5.98	9.02	11.01	5.02	3.64	7.66	19.18	0.57	10.57

¹ Compositions expressed in wt. % are in the first row, in mol. % - in the second row.

² LOD was 0.4–0.5 wt. % for Pt, Au, Bi, and 0.1-0.2 wt. % for the others.