



FIGURE S1. Variation in wavenumber, FWHM, and intensity of Raman bands of arsenian pyrite as a function of laser powers. These two grains were in size of approximately 60 μm (a) and 90 μm (b), respectively.

TABLE S1. Chemical compositions of pyrite from the Dongyang gold deposit by EMPA.

Sample	As(wt%) (0.01)	S (0.01)	Fe (0.01)	Ni (0.01)	Ag (0.02)	Sb (0.01)	Co (0.01)	Total	As(at%)	S	Fe	Ni	Ag	Sb	Co
DY1033-10-1	8.18	48.26	43.43	b.l.	0.02	0.76	0.03	100.67	4.55	62.75	32.42	b.l.	b.l.	0.26	0.02
DY1033-10-2	6.48	48.38	42.73	0.12	0.08	1.41	0.03	99.23	3.64	63.52	32.21	0.08	0.03	0.49	0.02
DY1033-10-3	5.65	50.23	44.85	b.l.	b.l.	0.25	b.l.	100.99	3.08	64.01	32.82	b.l.	b.l.	0.09	b.l.
DY1033-10-4	6.29	49.23	43.85	b.l.	0.01	0.98	b.l.	100.38	3.48	63.63	32.54	b.l.	b.l.	0.33	b.l.
DY1033-10-5	4.06	51.83	45.61	b.l.	b.l.	0.32	b.l.	101.83	2.18	64.92	32.80	b.l.	b.l.	0.11	b.l.
DY1033-10-6	6.75	48.54	42.84	b.l.	0.16	1.76	b.l.	100.05	3.77	63.42	32.13	b.l.	0.06	0.60	b.l.
DY1033-10-7	7.79	48.49	43.60	b.l.	0.03	0.83	b.l.	100.74	4.32	62.91	32.47	b.l.	b.l.	0.28	b.l.
DY1033-10-8	6.82	48.77	43.49	b.l.	b.l.	1.33	b.l.	100.39	3.79	63.34	32.42	b.l.	b.l.	0.45	b.l.
DY1033-10-9	7.45	48.81	43.22	b.l.	0.03	1.04	b.l.	100.56	4.14	63.31	32.18	b.l.	b.l.	0.36	b.l.
DY1033-10-10	6.70	49.34	43.71	b.l.	0.02	0.81	0.02	100.60	3.70	63.64	32.37	b.l.	b.l.	0.27	0.01
DY1033-10-11	2.74	52.30	45.98	b.l.	b.l.	0.16	b.l.	101.18	1.47	65.44	33.04	b.l.	b.l.	0.05	b.l.
DY1033-10-12	2.84	52.08	45.92	b.l.	0.02	0.20	b.l.	101.04	1.52	65.34	33.07	b.l.	b.l.	0.07	b.l.
DY1033-10-13	3.00	52.15	45.99	b.l.	0.02	0.20	b.l.	101.37	1.61	65.27	33.05	b.l.	b.l.	0.07	b.l.
DY1033-10-14	3.88	51.31	45.64	b.l.	0.02	0.27	b.l.	101.13	2.10	64.74	33.07	b.l.	b.l.	0.09	b.l.
DY1033-10-15	3.66	51.76	45.63	b.l.	0.01	0.33	b.l.	101.39	1.96	65.02	32.91	b.l.	b.l.	0.11	b.l.
DY1033-10-16	0.70	53.70	46.68	b.l.	0.02	0.32	b.l.	101.41	0.37	66.39	33.14	b.l.	b.l.	0.10	b.l.
DY1033-10-17	1.25	53.62	46.63	b.l.	b.l.	0.31	b.l.	101.80	0.66	66.19	33.05	b.l.	b.l.	0.10	b.l.
DY1033-10-18	7.10	49.17	43.93	0.01	0.04	0.37	b.l.	100.63	3.92	63.40	32.52	b.l.	b.l.	0.13	b.l.
DY1033-10-19	7.76	48.31	43.42	0.02	0.05	0.66	0.01	100.23	4.33	62.93	32.48	0.01	b.l.	0.23	b.l.
DY1033-10-20	7.34	48.57	43.52	b.l.	0.01	0.60	b.l.	100.06	4.09	63.19	32.51	b.l.	b.l.	0.21	b.l.
DY1033-10-21	3.23	51.20	44.80	0.03	0.02	0.12	0.06	99.46	1.76	65.31	32.81	0.02	b.l.	0.04	0.04
DY1033-10-22	4.49	50.54	44.50	b.l.	0.02	0.25	b.l.	99.80	2.46	64.73	32.72	b.l.	b.l.	0.08	b.l.

DY1033-10-23	3.45	51.01	44.86	0.02	0.02	0.25	0.03	99.65	1.89	65.11	32.88	0.02	b.l.	0.08	0.02
DY1033-10-24	2.77	51.98	45.74	b.l.	b.l.	0.18	0.04	100.72	1.49	65.39	33.03	b.l.	b.l.	0.06	0.02
DY1033-7-1	5.31	50.55	45.13	b.l.	0.03	b.l.	b.l.	101.03	2.89	64.19	32.90	b.l.	b.l.	b.l.	b.l.
DY1033-7-2	6.19	50.01	45.31	b.l.	b.l.	b.l.	b.l.	101.51	3.37	63.57	33.06	b.l.	b.l.	b.l.	b.l.
DY1033-7-3	0.11	54.70	46.76	0.40	b.l.	b.l.	0.03	101.98	0.06	66.85	32.81	0.27	b.l.	b.l.	0.02
DY1033-7-4	3.38	51.98	46.51	0.02	b.l.	b.l.	0.01	101.92	1.80	64.86	33.31	0.01	b.l.	b.l.	b.l.
DY1033-7-5	5.37	50.23	45.58	b.l.	b.l.	b.l.	b.l.	101.18	2.92	63.82	33.26	b.l.	b.l.	b.l.	b.l.
DY1033-7-6	3.19	51.98	46.27	b.l.	b.l.	0.01	b.l.	101.48	1.71	65.04	33.24	b.l.	b.l.	b.l.	b.l.
DY1033-7-7	3.45	51.77	46.02	b.l.	0.02	b.l.	b.l.	101.24	1.85	64.98	33.17	b.l.	b.l.	b.l.	b.l.
DY1033-7-8	6.86	47.73	44.33	b.l.	0.01	0.01	b.l.	98.94	3.86	62.70	33.43	b.l.	b.l.	b.l.	b.l.
DY1033-7-9	b.l.	53.75	46.86	b.l.	0.02	0.06	b.l.	100.68	b.l.	66.63	33.35	b.l.	b.l.	0.02	b.l.

Note: b.l. = below detection limit; Detection limits are presented below each element label.

TABLE S2. Band positions, widths (FWHM) (cm⁻¹) and intensities in Raman spectra of arsenian pyrite samples.

Sample	As	Eg	FWHM	Intensity	Ag	FWHM	intensity	Tg(3)	FWHM	intensity	R²
DY1033-10-1	4.55	331	17.9	421	363	29.5	1606	414	31.4	170	0.998
DY1033-10-2	3.64	335	18.5	321	365	25.3	1315	419	27.0	108	0.997
DY1033-10-3	3.08	339	16.2	738	370	19.1	1573	422	27.1	122	0.998
DY1033-10-4	3.48	335	17.0	564	365	22.3	1313	418	22.9	97	0.997
DY1033-10-8	3.79	328	17.3	461	357	27.0	1931	410	29.1	101	0.997
DY1033-10-9	4.14	329	20.6	550	358	26.2	1770	410	28.4	101	0.998
DY1033-10-10	3.70	334	16.8	829	364	19.6	2119	416	25.9	121	0.998
DY1033-10-11	1.47	343	14.4	812	376	16.4	1549	430	21.7	174	0.995
DY1033-10-12	1.52	342	13.3	729	376	15.7	1511	429	18.2	187	0.996
DY1033-10-13	1.61	346	9.0	1573	381	9.7	2196	434	15.2	208	0.996
DY1033-10-15	1.96	340	14.0	640	373	17.4	1304	427	21.8	140	0.995
DY1033-10-16	0.37	344	9.3	2934	379	12.7	3281	432	15.9	346	0.998
DY1033-10-17	0.66	343	12.9	2506	377	14.4	3381	431	23.4	226	0.998
DY1033-10-18	3.92	328	16.9	1266	355	29.0	3478	408	27.5	110	0.997
DY1033-10-19	4.33	328	15.3	700	358	23.7	2932	410	26.0	166	0.997
DY1033-10-20	4.09	338	33.1	420	367	31.7	742	413	42.0	93	0.995
DY1033-10-21	1.76	345	19.8	462	377	24.4	961	432	30.8	119	0.997
DY1033-10-22	2.46	343	18.1	452	375	21.3	1152	429	29.2	117	0.998
DY1033-10-23	1.89	347	13.0	1084	382	15.8	1374	436	23.3	180	0.996
DY1033-10-24	1.49	348	20.6	726	379	22.3	1105	436	29.5	101	0.997
DY1033-7-1	2.89	341	18.2	1243	370	16.9	2069	420	34.8	88	0.998
DY1033-7-4	1.80	338	16.9	1435	369	16.1	2629	420	25.7	130	0.998
DY1033-7-5	2.92	338	15.9	1830	368	13.9	3365	418	30.1	133	0.998

DY1033-7-6	1.71	345	13.9	1911	377	12.3	2537	433	21.9	153	0.997
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TABLE S3. Euler angles refer to Sample Coordinate system for arsenian pyrite grains. Abbreviation: MAD = mean angular deviation.

Sample	Euler1	Euler2	Euler3	MAD
DY1033-10-1	354.1	52.37	133.76	0.8948
DY1033-10-1	353.26	53.027	134.62	0.6958
DY1033-10-2	53.919	28.811	52.492	0.5601
DY1033-10-2	54.945	29.147	51.849	0.6461
DY1033-10-3	358.63	12.617	93.6	0.528
DY1033-10-4	46.517	27.653	59.887	0.5931
DY1033-10-4	46.575	27.183	60.72	0.6156
DY1033-10-5	60.637	26.255	81.978	0.6079
DY1033-10-6	227.35	50.251	137.51	0.749
DY1033-10-7	227.25	50.29	137.72	0.6209
DY1033-10-8	57.13	30.955	95.802	0.8176
DY1033-10-8	56.749	30.876	96.08	0.6663
DY1033-10-10	245.78	21.237	3.5853	0.4312
DY1033-10-10	245.94	20.995	3.6106	0.5016
DY1033-10-11	213.51	39.886	21.572	0.6289
DY1033-10-11	213.05	39.672	21.782	0.7537
DY1033-10-12	258.86	26.348	11.922	0.7337
DY1033-10-12	258.87	25.977	12.153	0.6225
DY1033-10-13	289.37	26.338	118.35	0.8671
DY1033-10-13	288.91	26.852	118.81	0.7792
DY1033-10-14	235.91	27.46	51.143	0.5997

DY1033-10-14	235.08	28.015	51.981	0.6216
DY1033-10-15	331.91	41.297	41.4	0.6304
DY1033-10-16	180.16	29.035	53.428	0.5309
DY1033-10-16	179.91	29.35	53.926	0.659
DY1033-10-17	339.11	41.335	21.201	0.6746
DY1033-10-17	339.07	41.286	20.536	0.8706
DY1033-10-18	200.29	13.472	81.112	0.5168
DY1033-10-18	200.33	13.488	80.665	0.7094
DY1033-10-19	53.472	41.437	117.32	0.4913
