Supplementary Materials

Protoenstatite: a new mineral in Oregon sunstones with "watermelon" colors

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Figure S1. Carved and faceted colored sunstones. Top row (from left to right): watermelon carving, "The Blossom" red sunstone carving by Dalan Hargrave, schiller carving with diamonds by Dalan Hargrave (27.40 carats). Bottom Row (from left to right): red faceted sunstone (12.18 carats), green faceted sunstone by John Dyer (4.62 carats), red faceted sunstone (8.67 carats).

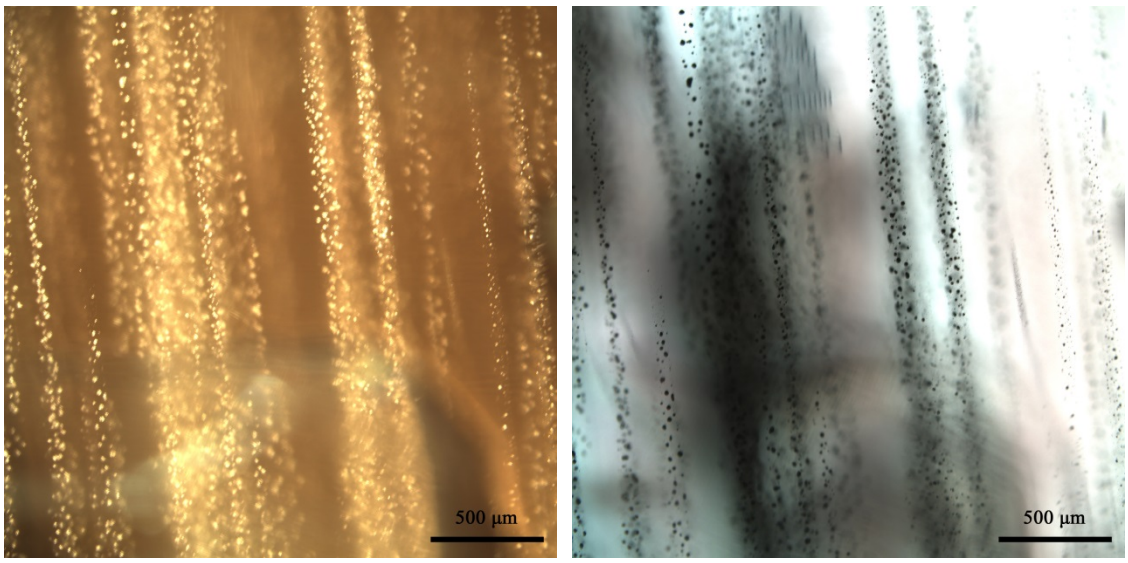

Figure S2. A schiller sunstone under reflected light (left) versus transmitted light (right) viewed from (010).

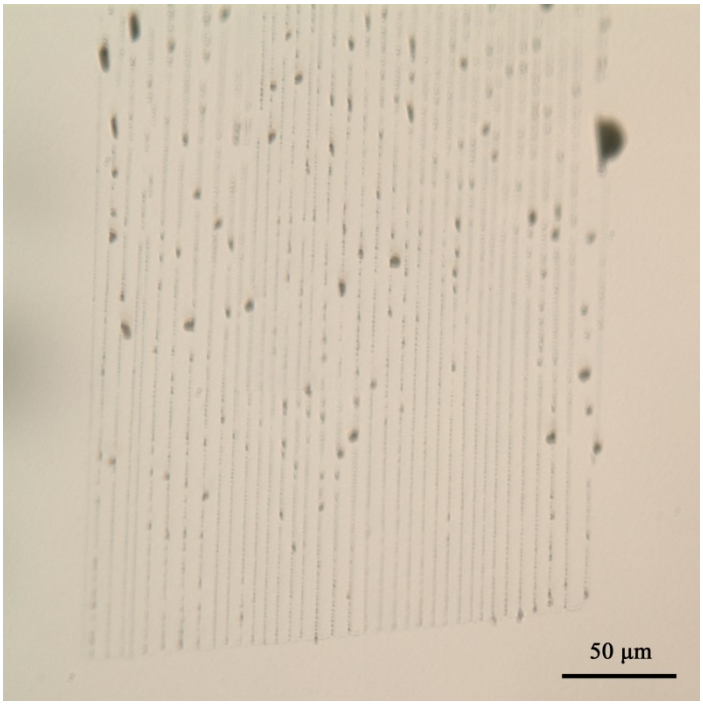

Figure S3. Detailed array of Cu precipitates viewed from (010) at 40X magnification.

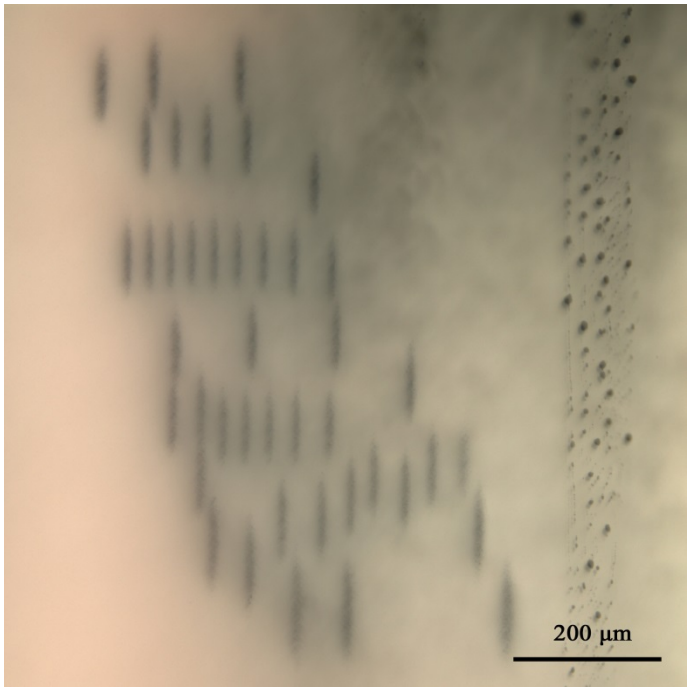

Figure S4. Strange dashes in a watermelon schiller sunstone viewed from (010).

Table S1: Calculated powder diffraction peaks for the Fe-Al-bearing protoenstatite.

h	*k*	*l*	*d(hkl)*	2-Theta	Intensity	*h*	*k*	*l*	*d(hkl)*	2-Theta	Intensity
1	1	0	6.3681	13.8944	2.20%	3	5	0	1.5259	60.6344	1.70%
2	0	0	4.6250	19.1735	1.00%	**5**	**3**	**1**	**1.5003**	**61.7807**	**20.00%**
1	1	1	4.0828	21.7491	18.80%	1	3	3	1.4967	61.9476	12.90%
2	**1**	**1**	**3.2435**	**27.4751**	**20.40%**	5	1	2	1.4966	61.9519	4.50%
2	**2**	**0**	**3.1840**	**27.9986**	**47.20%**	3	5	1	1.4668	63.3553	3.70%
1	**2**	**1**	**3.1797**	**28.0378**	**100.00%**	0	6	0	1.4633	63.5206	8.10%
3	**1**	**0**	**2.9092**	**30.7062**	**37.70%**	1	5	2	1.4474	64.3022	2.90%
1	3	0	2.7903	32.0483	2.30%	6	2	1	1.4031	66.5928	1.20%
2	**2**	**1**	**2.7321**	**32.7505**	**31.90%**	0	4	3	1.3794	67.8891	2.20%
0	0	2	2.6600	33.6641	1.30%	4	4	2	1.3661	68.6455	1.40%
1	**0**	**2**	**2.5564**	**35.0717**	**21.60%**	3	3	3	1.3609	68.9406	7.60%
3	1	1	2.5525	35.1277	17.30%	6	0	2	1.3338	70.5455	3.70%
1	**3**	**1**	**2.4711**	**36.3244**	**24.50%**	2	4	3	1.3219	71.2809	1.30%
2	**0**	**2**	**2.3058**	**39.0288**	**32.90%**	6	3	1	1.3213	71.3189	7.80%
2	3	1	2.2426	40.1754	6.10%	6	1	2	1.3187	71.4782	3.60%
2	1	2	2.2302	40.4089	3.10%	1	0	4	1.3165	71.6189	4.70%
3	3	0	2.1227	42.5525	1.80%	7	1	0	1.3067	72.2369	1.00%
4	1	1	2.0615	43.8797	3.70%	2	0	4	1.2782	74.1135	3.10%
4	2	0	2.0460	44.2301	2.20%	1	6	2	1.2700	74.6741	4.30%
2	2	2	2.0414	44.3355	5.10%	7	1	1	1.2690	74.7425	2.00%
2	4	0	1.9830	45.7131	4.90%	5	1	3	1.2668	74.8950	3.20%

1	4	1	1.9820	45.7388	12.50%	5	5	1	1.2386	76.9048	1.40%
3	3	1	1.9716	45.9940	25.60%	4	5	2	1.2378	76.9614	1.60%
3	1	2	1.9631	46.2036	3.00%	1	5	3	1.2366	77.0558	3.00%
4	2	1	1.9096	47.5754	3.50%	4	6	0	1.2366	77.0565	1.10%
2	4	1	1.8581	48.9797	1.00%	2	6	2	1.2355	77.1320	6.50%
3	2	2	1.8306	49.7652	2.40%	2	2	4	1.2272	77.7508	1.00%
5	1	0	1.8103	50.3638	4.50%	4	0	4	1.1529	83.8392	1.50%
4	0	2	1.7452	52.3805	7.40%	5	5	2	1.1487	84.2150	3.70%
1	5	0	1.7252	53.0352	5.20%	4	1	4	1.1431	84.7256	1.60%
4	3	1	1.7173	53.2976	7.20%	3	7	1	1.1351	85.4666	1.10%
5	1	1	1.7138	53.4170	1.20%	4	6	2	1.1213	86.7730	3.30%
4	1	2	1.7117	53.4857	1.90%	8	2	0	1.1181	87.0832	1.00%
1	1	3	1.7083	53.6001	5.70%	4	2	4	1.1151	87.3778	1.10%
0	4	2	1.6930	54.1246	3.80%	1	8	1	1.0677	92.3442	1.50%
1	4	2	1.6653	55.0993	3.10%	6	5	2	1.0622	92.9664	1.40%
3	3	2	1.6592	55.3223	1.00%	8	0	2	1.0604	93.1668	1.10%
0	2	3	1.6443	55.8675	14.30%	7	5	0	1.0559	93.6886	2.40%
1	5	1	1.6411	55.9857	3.80%	7	5	1	1.0357	96.0997	1.20%
4	2	2	1.6218	56.7121	11.20%	5	5	3	1.0345	96.2477	1.20%
2	5	1	1.5687	58.8155	2.10%	2	2	5	1.0092	99.5065	1.20%
6	0	0	1.5417	59.9499	3.30%	6	0	4	1.0070	99.7901	1.00%

Note: Peaks with less than 1 % of intensity are omitted. Eight strong peaks are highlighted in bold.