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A NEW DEPOSIT OF JEREMEJEVITE FROM THE MOGOK STONE TRACT, MYANMAR

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ABSTRACT

A number of colourless and light yellow terminated prismatic gem quality crystals, which had a very similar appearance to that of quartz and beryl, were purchased in Mogok. Following detailed study these crystals were found to be jeremejevite, which is one of the rarest gemstones found on the planet earth. This paper provides details of the habit, crystallography, physical properties, optical properties, microscopic characteristics, XRD and EDX-RF data for this very rare gemstone.

INTRODUCTION

Myanmar, a cornucopia for both common and precious gemstones, is also fortunately endowed with rare gemstones such as johachidolite, serendibite, and poudretteite.

Last year, while the authors were at the Htar Pwe – a location in Mogok where rough and faceted gemstones, crystals and minerals are sold - they came across some crystals that had a very similar appearance to quartz and beryl. They purchased these as crystals of quartz and beryl. When the authors returned to Yangon, they studied the crystals that were thought to be quartz and beryl. Fortunately, they discovered that the crystals were those of jeremejevite. Following further investigation the authors learned that these crystals came from both the alluvial sediments and the pegmatite dykes of the Mogok Stone Tract in Myanmar.

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Fig. 1. A faceted jeremejevite of 4.35 ct from Mogok, Myanmar.

DESCRIPTION OF SPECIMENS

A 4.35 ct emerald-cut jeremejevite from Mogok is illustrated in figure 1, while figure 2 shows a selection of the gem quality crystals from this locality. The common habits displayed, by both singly and doubly terminated crystals from this locality, are illustrated in figure 3.

Fig. 3. A selection of gem quality jeremejevite crystals from Mogok, Myanmar.

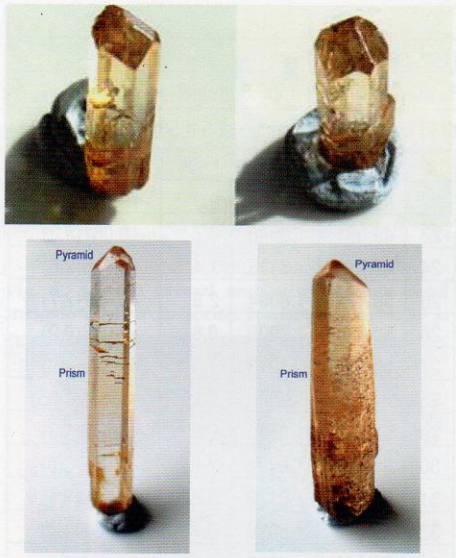

Fig. 3. The common habits displayed by crystals of jeremejevite from Mogok, Myanmar.

RESULTS OF INVESTIGATIONS

The results of our gemmological investigation into these crystals of gem quality jeremejevite are presented in table 1.

Microscopic features

Using a gemmological microscope, the pattern of inclusions found in these jeremejevite crystals included a distinct octahedral crystal with a metallic lustre (Fig, 4) that was surrounded by minute solid inclusions of undetermined identity. Additionally, feather-like 'liquid; inclusions were are also common, These feather-like 'liquid' inclusions were oriented perpendicular to the c-axis of the crystals as indicated in figure 5,.

X-ray diffraction characteristics

An X-ray diffraction analysis (XRD) of the specimen was conducted at the XRD Laboratory, D.A.E, Myanmar, using a RIGAKU RINT 2000/PC Series, Japan unit that was fitted with Cu tube that operated at 40kV and 30mA.The XRD report (Table 1) identified the phase as PDF # (75-1789) or the mineral jeremejevite.

EDX-RF characteristics

An x-ray fluorescence analysis of a specimen of rough jeremejevite is shown in figure 6. The sample was analysed by an EDX-700 in a vacuum at 40 keV using Na-U standards.

The qualitative results of this analysis are presented in table 2.

Chemical composition	$Al_6B_5O_{15}$ $(F,OH)_3$
Crystal system	Hexagonal
Class	Hexagonal dipyramidal
Habit	Mainly long prismatic
Form	Mainly made up of prism and pyramid, and prism, pyramid and pinacoid as shown in figure 3
Colour	Colourless and light yellow
Dichroism	Colourless and along the c-axis shows a yellow colour
Diaphaneity	Transparent
Lustre	Vitreous
Fracture	Conchoidal
Hardness	Harder than feldspar (approximately 7 on Mohs scale)
Specific gravity	3.28 – 3.31 (using the hydrostatic method)
Streak	Colourless
Refractive index	$\omega = 1.653$, $\varepsilon = 1.640$
Birefringence	0.013
Optic sign	Uniaxial negative
UV fluorescence (LWUV & SWUV)	Inert

Table 1. Gemmological characteristics of jeremejevite from the Mogok Stone Tract.

Sample-2-1002-1.raw (Sample-2)
SCAN : 5.0/70.0/0.02/0.3(sec), Cu(40kV,30mA),I(max)=4192, 02/02/05 10:19
PEAK: 15-pts/Parabolic Filter, Threshold=3.0. Cutoff=0.1%.BG=3/1.0, Peak-Top= Summit

NOTE: Intensity = Counts, 2T (0) = 0.0(degree). Wavelength to compute d-Spacing = 1.54056A (Cu/K-alpha 1)

#	2-Theta	d (A)	I %	Jeremejevite
1	11.920	7.4183	8.8	+0.014(15.3)
2	16.053	5.5165	0.5	+0.078(0.4)
3	20.721	4.2832	100.0	0.025(100.0)
4	21.662	4.0992	10.5	+0.062(20.4)
5	23.420	3.7952	35.1	+0.030(43.3)
6	23.958	3.7113	1.9	+0.042(2.0)
7	24.800	3.5871	9.8	+0.057(18.1)
8	26.342	3.3805	4.8	+0.048(3.5)
9	31.880	2.8048	17.6	+0.049(23.8)
10	32.574	2.7466	1.6	+0.019(1.6)
11	33.758	2.6529	28.7	+0.045(33.5)
12	35.021	2.5601	18.0	+0.037(11.8)
13	36.318	2.4716	15.9	+0.025(16.9)
14	39.099	2.3019	14.7	+0.064(18.1)
15	41.018	2.1986	34.6	+0.066(50.7
16	42.222	2.1386	2.9	-0.007(2.4)
17	42.681	2.1167	18.2	+0.058(22.5)
18	43.981	2.0571	64.4	+0.045(43.6)
19	45.405	1.9958	0.5	+0.066(0.6)
20	45.959	1.9730	1.2	+0.070(1.7)
21	46.398	1.9554	24.1	+0.059(28.6)
22	47.940	1.8960	9.3	+0.023(5.6)
23	49.081	1.8546	4.7	+0.061(4.3)
24	49.738	1.8316	1.4	+0.046(2.6)
25	50.422	1.8084	2.9	+0.052(2.7)
26	50.598	1.7906	0.8	+0.032(0.9)
27	53.840	1.7013	7.0	+0.049(6.9)
28	54.440	1.6840	23.9	+0.051(34.5)
29	55.559	1.6527	0.8	+0.066(1.3)
30	55.940	1.6424	2.7	+0.058(3.0)
31	56.863	1.6179	3.8	+0.036(3.1)
32	57.638	1.5979	0.9	+0.053(1.4)
33	58.060	1.5873	4.9	+0.046(6.8)
34	58.519	1.5760	3.0	+0.056(4.1)
35	60.499	1.5290	5.0	+0.078(9.0)
36	61.599	1.5044	6.4	+0.036(6.0)
37	65.340	1.4270	15.0	+0.050(8.5)
38	66.037	1.4136	1.1	+0.085(1.4)
39	66.699	1.4012	3.3	+0.046(4.2)
40	67.219	1.3916	38.2	+0.055(36.3)
41	68.741	1.3644	5.3	+0.111(10.2)
42	69.721	1.3476	8.1	+0.072(1.0)

PDF # 75 – 1789 – Jeremejevite > 2T(0) = 0.0, d/d(0) = 1.0

Table 1 XRD report that identified the unknown mineral as jeremejevite.

Oxide	Result (%)	Std. Dev.	Proc.–Calc.	Line	Int.(cps/uA)
Al_2O_3	91.808%	1.647	Quan-FP	Al Ka	2.317
SiO_2	4.618%	0.346	Quan-FP	Si Ka	0.133
SO_3	2.852%	0.137	Quan-FP	S Ka	0.322
Ho_2O_3	0.350%	0.018	Quan-FP	Ho La	0.277
Ga_2O_3	0.261%	0.007	Quan-FP	Ga Ka	0.996
ZnO	0.112%	0.005	Quan-FP	Zn Ka	0.384

Table 2. EDX-RF quantitative analysis of a jeremejevite crystal.

Fig. 4. A solid crystal and other minute solid inclusions in jeremejevite. Transmitted light. 30 x.

Fig. 5. A feather-like 'liquid' inclusion in jeremejevite. Transmitted light. 30 x.

CONCLUSION

These rare, gem quality jeremejevite crystals are mainly obtained from the alluvial sediments and pegmatite dykes of the Mogok Stone Tract. Crystals of jeremejevite are found in the Loi-Sau Mountain that is located north-east of Mogok, some 12 miles (19 km) 'as the crow flies' from the Mogok Stone Tract. This rare gem mineral is found in association with rubellite (all are prismatic of form), schorl, rock crystal, elbaite, orthoclase, clevelandite and Li-mica. The largest gemmy jeremejevite crystal found to date is 1.5 inches (4 cm) long and 0.5 inches (1.3 cm) in diameter. It is possible that further discoveries of

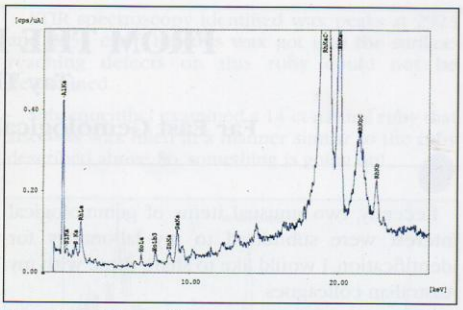

Fig. 9. X-ray fluorescence spectrum of a jeremejevite crystal.

gemmy jeremejevite from Mogok Stone Tract could make it a gemstone of interest to gemmologists and gem collectors.

Acknowledgment

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