Ziminaite $Fe^{3+}VO_4$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. As lamellar, tabular, flattened prismatic or hoper crystals to 50 μm, epitaxially overgrown on koksharovite. As spongy aggregates of irregularly shaped grains to 0.15 mm.

Physical Properties: *Cleavage*: None. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = ~4.5 VHN = 379-495, 426 average (20 g load). D(meas.) = n.d. D(calc.) = 3.448

Optical Properties: Translucent. *Color*: Yellowish brown; light gray with intense deep yellow internal reflections in reflected light. *Streak*: Yellow. *Luster*: Adamantine.
Optical Class: n.d. *Bireflectance*: Weak.
R_1-R_2: (470) 16.3-17.7, (546) 14.1-15.7, (589) 13.8-15.1, (650) 13.6-14.7

Cell Data: Space Group: $P\bar{1}$. a = 8.012(4) b = 9.345(5) c = 6.678(3) α = 106.992(10)° β = 101.547(8)° γ = 96.594(11)° Z = 1

X-ray Powder Pattern: Bezymyannyi volcano, Kamchatka, Russia.
3.209 (100), 3.539 (86), 3.270 (67), 1.665 (24), 3.090 (20), 3.041 (18), 3.751 (17)

Chemistry:

	(1)	(2)
MgO	2.20	
CaO	0.01	
Al_2O_3	7.81	
Fe_2O_3	27.18	46.75
TiO_2	4.50	
SiO_2	0.26	
P_2O_5	0.09	
V_2O_5	57.01	53.25
Total	99.06	100.00

(1) Bezymyannyi volcano, Kamchatka, Russia; average of 5 electron microprobe analyses Fe^{3+} confirmed by structure refinement; corresponds to $(Fe^{3+}_{3.29}Al_{1.48}Ti_{0.54}Mg_{0.53})_{\Sigma=5.84}(V_{6.05}Si_{0.04}P_{0.01})_{\Sigma=6.10}O_{24}$. (2) $Fe^{3+}VO_4$.

Mineral Group: Howardevansite group.

Occurrence: As fumarole sublimates on volcanic scoria.

Association: Koksharovite, bannermanite, quartz, biotite, Ti-V-bearing magnetite.

Distribution: At Bezymyannyi volcano, Kamchatka, Far-Eastern Region, Russia.

Name: For the *Zimina* volcano, located 12 km south of the Bezymyannyi volcano, Russia.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4603/1).

References: (1) Pekov, I.V., O.I. Siidra, V.O. Yapaskurt, Y.S. Polekhovsky, and P.M. Kartashov (2018) Ziminaite, $Fe^{3+}VO_4$, a new howardevansite-group mineral from the Bezymyannyi volcano, Kamchatka, Russia. Mineral. Petrol., 112(3), 371-379. (2) (2019) Amer. Mineral., 104(5), 784 (abs. ref 1).