Vlasovite $Na_2ZrSi_4O_{11}$

Crystal Data: Monoclinic. *Point Group:* $2/m$. In crystals, to 15 cm; more commonly as subrounded to irregularly shaped grains and aggregates of such grains. *Twinning:* Twin plane {010}, uncommon.

Physical Properties: *Cleavage:* {010}, good; {$h0l$}, poor. *Fracture:* Uneven to conchoidal. Hardness = 6 VHN = 770 D(meas.) = 2.92–2.97 D(calc.) = [3.07] Altered portions fluoresce brownish yellow under SW UV.

Optical Properties: Transparent. *Color:* Colorless, pink, pale brown, silvery; in transmitted light, colorless. *Luster:* Greasy; highly vitreous to pearly on cleavage surfaces.
Optical Class: Biaxial (–). *Dispersion:* $r > v$, distinct. $\alpha = 1.605(3)$ $\beta = 1.623(3)$ $\gamma = 1.625(3)$ 2V(meas.) = 40°–56°

Cell Data: *Space Group:* $C2/c$. $a = 10.98(4)$ $b = 10.00(4)$ $c = 8.52(3)$ $\beta = 100°24'$ Z = 4

X-ray Powder Pattern: Kipawa River, Canada.
5.053 (100), 3.669 (75), 3.882 (45), 3.237 (40), 3.363 (35), 3.548 (25), 1.945 (20)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	55.76	56.57	CaO	0.49	0.41
TiO_2	trace		Na_2O	14.03	14.38
ZrO_2	28.11	28.14	K_2O	0.68	0.15
Al_2O_3	0.20		F	0.20	
Fe_2O_3	0.10		H_2O^+	0.32	
Nb_2O_5	0.33		H_2O^-	0.09	
FeO	0.00		LOI		0.11
MnO	trace		$-O = F_2$	0.08	
MgO	0.06	0.23	Total	100.29	99.99

(1) Mt. Vavnbed, Russia; ZrO_2 includes HfO_2 1.7%; corresponds to $(Na, K, Ca)_{2.00}Zr_{0.96}Si_{3.91}O_{11}$.
(2) Ascension Island; corresponds to $(Na, K, Ca)_{2.02}Zr_{0.97}Si_{4.01}O_{11}$.

Polymorphism & Series: May invert to triclinic symmetry below 29 °C.

Occurrence: A late phase in nepheline syenites, syenitic pegmatites, and along the contact zone of a differentiated alkalic massif (Lovozero massif, Russia); in miarolitic cavities in ejected blocks of peralkalic granite (Ascension Island).

Association: Eudialyte, microcline, albite, lorenzenite, arfvedsonite, magnesio-katophorite, aegirine, aenigmatite, fayalite, pyrochlore, apatite, fluorite.

Distribution: In Russia, from near Mt. Vavnbed, Lovozero massif, Kola Peninsula; and in the Burpala massif, about 120 km north of Lake Baikal, eastern Siberia. Large crystals from the [Sheffield Lake complex,] Kipawa River, Villedieu Township, Quebec, Canada. On Green Mountain, Ascension Island, southern Atlantic Ocean.

Name: In honor of the Russian mineralogist and geochemist Kuz'ma Alekseevich Vlasov (1905–1964), founder of the Institute of Mineralogy, Geochemistry, and Crystal Chemistry of Rare Elements, Moscow, Russia.

Type Material: Mining Institute, St. Petersburg, 1037/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 83207, vis5052; National School of Mines, Paris, France.

References: (1) Tikhonenkova, R.P. and M.E. Kazakova (1961) Vlasovite, a new zirconium silicate from the Lovozero massif. Doklady Acad. Nauk SSSR, 137, 944–946 (in Russian). (2) (1961) Amer. Mineral., 46, 1202–1203. (abs. ref. 1). (3) Fleet, S.G. and J.R. Cann (1967) Vlasovite: a second occurrence and a triclinic to monoclinic inversion. Mineral. Mag., 36, 233–241. (4) Gittins, J., E.L. Gasparrini, and S.G. Fleet (1973) The occurrence of vlasovite in Canada. Can. Mineral., 12, 211–214. (5) Voronkov, A.A., T.A. Zhdanova, and Y.A. Pyatenko (1974) Refinement of the structure of vlasovite $Na_2ZrSi_4O_{11}$ and some characteristics of the composition and structure of zirconosilicates. Kristallografiya (Sov. Phys. Crystal.), 19, 252–259 (in Russian).