

Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals commonly distorted, flattened, pseudotetragonal, to 2 cm. *Twinning:* Possibly on {001}.

Physical Properties: *Fracture:* Uneven. Hardness = 5-5.5 D(meas.) = 3.44-3.46 D(calc.) = 3.159

Optical Properties: Transparent to translucent. *Color:* Dark brown to golden yellow. *Streak:* White with pale brownish tint. *Luster:* Vitreous.

Optical Class: Biaxial (-). $\alpha = 1.873$ -1.886 $\beta = 1.930$ $\gamma = 1.914$ -1.939 $2V(\text{meas.}) = 0^\circ$ -7°

Cell Data: *Space Group:* C2/c. $a = 10.183(2)$ $b = 10.183(2)$ $c = 20.396(4)$ $\beta = 97.19(3)^\circ$ $Z = 4$

X-ray Powder Pattern: Khibiny massif, Russia.

3.058 (100), 2.815 (60), 1.518 (55), 1.801 (50), 1.687 (45), 1.552 (40), 2.530 (35)

| Chemistry: | (1) | (2) |
|--------------------------------|-------|--------|
| SiO ₂ | 22.46 | 22.09 |
| TiO ₂ | 17.08 | 17.06 |
| Nb ₂ O ₅ | 21.79 | 20.00 |
| Ta ₂ O ₅ | | 0.40 |
| FeO | | 0.15 |
| MnO | | 0.16 |
| CaO | 28.80 | 27.24 |
| SrO | | 0.83 |
| Na ₂ O | 6.92 | 7.29 |
| F | 4.23 | [5.24] |
| - O = F ₂ | 1.78 | 2.20 |
| Total | 99.50 | 99.85 |

(1) Khibiny massif, Russia; by electron microprobe, average of several analyses; corresponds to $(\text{Ca}_{5.64}\text{Na}_{2.42})_{\Sigma=8.06}(\text{Ti}_{2.36}\text{Nb}_{1.72})_{\Sigma=4.08}\text{Si}_4\text{O}_{21.78}[\text{F}_{2.30}(\text{OH})_{1.92}]_{\Sigma=4.22}$. (2) Khibiny massif, Russia; electron microprobe analysis, F calculated from stoichiometry; yields $(\text{Ca}_{5.29}\text{Na}_{2.56}\text{Sr}_{0.09}\text{Fe}^{2+}_{0.02}\text{Mn}^{2+}_{0.03})_{\Sigma=7.99}(\text{Ti}_{2.32}\text{Nb}_{1.64}\text{Ta}_{0.02})_{\Sigma=3.98}\text{Si}_{4.00}\text{O}_{22}\text{F}_3$.

Occurrence: In aegirine-rich nepheline pegmatites in a differentiated alkalic massif (Khibiny massif, Russia).

Association: Feldspar, pectolite, apatite, aegirine, lamprophyllite, rinkite, sulfides.

Distribution: On Mt. Eveslogchorr, Khibiny massif, Kola Peninsula, Russia. From Üdersdorf, Eifel district, Rheinland-Pfalz, Germany. From the Poços de Caldas massif, Minas Gerais, Brazil.

Name: For Academician Aleksandr Evgen'evich *Fersman* (1883-1945), eminent Russian mineralogist, geochemist, and gemologist.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 33193, 33194.

References: (1) Labuntsov, A.N. (1929) La fersmanite - un nouveau minéral des Monts Chibines [Khibiny massif]. Doklady Acad. Nauk SSSR, 12, 297-301 (in French). (2) (1931) Amer. Mineral., 16, 92 (abs. ref. 1). (3) Machin, M.P. (1977) Fersmanite, $(\text{Ca}, \text{Na})_4(\text{Ti}, \text{Nb})_2\text{Si}_2\text{O}(\text{F}, \text{OH})_2$: a restudy. Can. Mineral., 15, 87-91. (4) Saf'yanov, Y.N., R.I. Bochkova, and V.V. Ilyukhin (1984) The crystal structure of fersmanite. Kristallografiya (Sov. Phys. Crystal.), 29, 56-59 (in Russian). (5) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 564-566. (6) Sokolova, E., F.C. Hawthorne, and A.P. Khomyakov (2002) The crystal chemistry of fersmanite, $\text{Ca}_4(\text{Na}, \text{Ca})_4(\text{Ti}, \text{Nb})_4(\text{Si}_2\text{O}_7)_2\text{O}_8\text{F}_3$. Can. Mineral., 40, 1421-1428, 1743. (7) (2003) Amer. Mineral., 88, 1179 (abs. ref. 6 and comment).