

**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . [Massive.]

**Physical Properties:** Hardness = 3.9 VHN = 173 D(meas.) = n.d. D(calc.) = 4.073

**Optical Properties:** Semitransparent. *Color:* Pale yellow; dark gray in reflected light.

*Luster:* Vitreous.

*Optical Class:* Isotropic.  $n = 1.735$

**Cell Data:** *Space Group:*  $Pn\bar{3}m$ .  $a = 7.72(2)$   $Z = 4$

**X-ray Powder Pattern:** Mushiston deposit, Tajikistan.

3.840 (10), 1.728 (9), 1.570 (8), 2.217 (7), 1.031 (6), 1.117 (5), 1.287 (4)

Chemistry:	(1)	(2)
Sn	41.8	41.49
Fe	0.9	
Cu	0.3	
Zn	20.45	22.85
OH	36.0	35.66
Total	99.5	100.00

(1) Mushiston deposit, Tajikistan; by electron microprobe, average of six analyses; corresponding to  $(\text{Zn}_{0.89}\text{Fe}_{0.08}\text{Cu}_{0.01})_{\Sigma=0.98}\text{Sn}_{1.00}(\text{OH})_{6.04}$ . (2)  $\text{ZnSn}^{4+}(\text{OH})_6$ .

**Mineral Group:** Schoenfliesite group.

**Occurrence:** Formed by oxidation of earlier tin sulfides in tin deposits.

**Association:** Stannite, natanite, malachite, azurite, goethite (Mushiston deposit, Tajikistan).

**Distribution:** In the Trudovoye tin deposit, Inyl'chek Mountains, eastern Kyrgyzstan. From the Mushiston tin deposit, Kaznok Valley, Zeravshan Mountains, 35 km south of Pendzhikent, Tajikistan.

**Name:** Honors Academician Vladimir Ivanovich Smirnov (1910–1988), Moscow University, Moscow, Russia, an early investigator of tin deposits in Central Asia.

**Type Material:** Mining Institute, St. Petersburg, 1997/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 81651.

**References:** (1) Marshukova, N.K., A.B. Palovskii, G.A. Sidorenko, and N.I. Chistyakova (1981) Vismirnovite,  $\text{ZnSn}(\text{OH})_6$ , and natanite,  $\text{FeSn}(\text{OH})_6$ , new tin minerals. *Zap. Vses. Mineral. Obshch.*, 110, 492–500 (in Russian). (2) (1982) *Amer. Mineral.*, 67, 1077 (abs. ref. 1). (3) (1982) *Mineral. Abs.*, 33, 170 (abs. ref. 1). (4) Cohen-Addad, C. (1967) Étude des hydroxystannates  $\text{CaSn}(\text{OH})_6$  et  $\text{ZnSn}(\text{OH})_6$  par diffraction des rayons X et résonance magnétique nucléaire. *Bull. Soc. fr. Minéral.*, 90, 32–35 (in French with English abs.).