Zvyagintsevite $(Pd, Pt, Au)_3(Pb, Sn)$

Crystal Data: Cubic. *Point Group:* $4/m\ \overline{3}\ 2/m$. As irregular grains up to 250 μm; massive in veinlets up to 120 μm long.

Physical Properties: Hardness = n.d. VHN = 241–318, 279 average (15 g load). D(meas.) = 13.32 (synthetic). D(calc.) = 13.42

Optical Properties: Opaque. *Color:* In reflected light, bright white with a cream tint. *Streak:* Black. *Luster:* Metallic.

R: (400) — , (420) — , (440) 62.0, (460) 63.3, (480) 63.0, (500) 63.7, (520) 64.6, (540) 65.5, (560) 66.7, (580) 67.7, (600) 67.4, (620) 67.3, (640) 67.9, (660) 68.0, (680) 68.0, (700) 68.1

Cell Data: *Space Group: Pm3m* (synthetic). a = 4.02(1) Z = 1

X-ray Powder Pattern: Synthetic Pd_3Pb.
2.32 (100), 1.215 (90), 2.01 (80), 1.423 (70), 0.923 (60), 0.900 (50), 1.163 (40)

Chemistry:

	(1)	(2)
Pd	55.0	57.3
Pt	7.5	
Au		3.6
Pb	25.0	38.7
Sn	12.0	
Cu	1.0	
Fe	1.0	
Ni	1.0	
Total	102.5	99.6

(1–2) Noril'sk region, Russia; by electron microprobe, averages.

Occurrence: As small irregular grains and veinlets in copper sulfides, associated with differentiated gabbro-diabase intrusives (Noril'sk region, Russia).

Association: Pt–Fe alloy, polarite, talnakhite, cubanite, pentlandite, magnetite, valleriite, Ag–Au alloy (Noril'sk region, Russia).

Distribution: From the Zapolyarni and Taimryskii mines, Noril'sk region, western Siberia, Russia. From the Upper and Banded zones of the Stillwater complex, Montana, USA. In the Kirakkajuppura deposit, Penikat layered complex, northeast of Kemi, Finland.

Name: For Professor Orest Evgen'evich Zvyagintsev (1894–1967), who did geochemical research on the platinum metals, Institute of General andInorganic Chemistry, Moscow, Russia.

Type Material: Canadian Geological Survey, Ottawa, Canada, 10401; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 73001.

References: (1) Genkin, A.D., I.V. Murav'eve, and N.V. Troneva (1966) Zvyagintsevite, a natural intermetallic compound of palladium, platinum, lead and tin. Geol. Rudn. Mestorozhd., 8, 94–100 (in Russian). (2) (1967) Amer. Mineral., 52, 299 (abs. ref. 1). (3) Cabri, L.J. and R.J. Traill (1966) New palladium minerals from Noril'sk, western Siberia. Can. Mineral., 8, 541–550. (4) (1967) Amer. Mineral., 52, 1587 (abs. ref. 3). (5) Cabri, L.J., Ed. (1981) Platinum group elements: mineralogy, geology, recovery. Can. Inst. Min. & Met., 147.