

Crystal Data: Orthorhombic. *Point Group:* n.d. As tabular or irregular grains, up to 0.2 x 0.05 mm.

Physical Properties: Hardness = n.d. VHN = 310–374, 353 (10 g load). D(meas.) = n.d. D(calc.) = 16.3

Optical Properties: Opaque. *Color:* In polished section, bright yellow-orange, resembling gold but having lower reflectivity. *Anisotropism:* Weak, in neutral gray shades.

R: (400) —, (420) 15.1, (440) 15.1, (460) 15.7, (480) 17.5, (500) 21.2, (520) 29.0, (540) 37.5, (560) 45.6, (580) 52.4, (600) 55.7, (620) 57.4, (640) 58.3, (660) 58.7, (680) 58.6, (700) 58.2

Cell Data: *Space Group:* n.d. $a = 4.036$ $b = 4.025$ $c = 4.061$ $Z =$ n.d. [*needsckZandcell??*]

X-ray Powder Pattern: Kamchatka, Russia. 2.33 (10), 1.744 (8-9), 2.61 (8), 3.30 (7), 1.144 (4), 1.405 (4), 1.073 (4)

Chemistry:

	(1)	(2)
Au	72.3	72.6
Ag	3.77	4.05
Cu	6.27	6.28
Fe	0.72	0.92
Pb	8.95	9.54
Te	7.16	7.15
Total	99.2	100.54

(1) Kamchatka, Russia; by electron microprobe, average of seven analyses of three samples, corresponding to $(\text{Au}_{3.65}\text{Ag}_{0.35})_{\Sigma=4.00}(\text{Cu}_{0.98}\text{Fe}_{0.13})_{\Sigma=1.11}(\text{Te}_{0.56}\text{Pb}_{0.43})_{\Sigma=0.99}$. (2) Do.; by electron microprobe, corresponding to $(\text{Au}_{3.63}\text{Ag}_{0.37})_{\Sigma=4.00}(\text{Cu}_{0.97}\text{Fe}_{0.16})_{\Sigma=1.15}(\text{Te}_{0.55}\text{Pb}_{0.45})_{\Sigma=1.00}$.

Occurrence: In the cementation zone of a volcanogenic gold telluride deposit, rarely as rims around grains of gold.

Association: Bilibinskite, bogdanovite, gold, tellurides of Cu, Fe and Pb.

Distribution: From the Aginsk gold telluride deposit, Kamchatka, Far Eastern Region, Russia.

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Type Material: Institute of Mineralogy and Geochemistry of Rare Elements, Moscow; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 79408.

References: (1) Spiridonov, E.M. and T.N. Chvileva (1979) Bezsmertnovite, Au₄Cu(Te, Pb); a new mineral from the zone of oxidation of deposits of the Far East. *Doklady Acad. Nauk SSSR*, 249, 185–189 (in Russian). (2) (1981) *Amer. Mineral.*, 66, 878 (abs. ref. 1). (3) Boček, L.I., Y.A. Malinovskiy, S.M. Sandomirskaya, and N.G. Chuvikina (1982) Bilibinskite and bezsmertnovite, new hybrid minerals of the intermetallic compound-oxide type rather than intermetallic compounds of gold. *Doklady Acad. Nauk SSSR*, 266, 1255–1259 (in Russian). (4) Criddle, A.J. and C.J. Stanley, Eds. (1993) *Quantitative data file for ore minerals*, 3rd ed. Chapman & Hall, London, 46.