Oulankaite $Pd_5Cu_4SnTe_2S_2$

Crystal Data: Tetragonal (based on XRD pattern). *Point Group*: n.d. As platy grains to 0.2 mm, with characteristic fine twins. Occurs as inclusions in chalcopyrite.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. Hardness = n.d. VHN = 156-334, 221 average (20 or 40 g load). D(meas.) = n.d. D(calc.) = 10.27(1)

Optical Properties: Opaque. *Color*: n.d. *Streak*: n.d. *Luster*: Metallic.
Optical Class: n.d. *Anisotropism*: Strong to moderate, yellowish white to bluish gray.
Bireflectance: Distinct to strong. *Pleochroism*: Purplish pink, creamy pink or grayish cream tints.
R_1-R_2: (470) 32.5-35.0 (23.5-27.0)$_{oil}$, (546) 35.0-40.3 (26.1-30.5)$_{oil}$, (589) 36.6-42.3 (27.3-32.1)$_{oil}$, (650) 37.4-43.6 (27.8-33.7)$_{oil}$ Ag-free
R_1-R_2: (470) 40.5-44.1 (24.2-31.9)$_{oil}$, (546) 45.0-49.5 (27.2-38.1)$_{oil}$, (589) 46.0-52.0 (28.2-40.1)$_{oil}$, (650) 45.8-53.5 (28.8-41.7)$_{oil}$ Ag-dominant

Cell Data: *Space Group*: n.d. a = 9.044(3) c = 4.937(3) Z = 2

X-ray Powder Pattern: Nadezhda deposit, northern Karelia, northwestern Russia.
2.472 (10), 2.260 (9), 2.022 (6), 1.213 (5), 1.205 (5), 1.129 (5), 1.361 (4)

Chemistry:

	(1)	(2)
Pd	43.72	43.08
Pt	2.74	2.11
Cu	14.92	6.92
Fe	2.71	2.68
Ag	0.11	9.97
Sn	9.11	9.12
Te	20.67	20.15
S	5.12	4.90
Total	99.10	98.93

(1) Nadezhda deposit, northern Karelia, northwestern Russia; average electron microprobe analysis; corresponds to $(Pd_{5.20}Pt_{0.18})_{\Sigma=5.38}(Cu_{2.96}Fe_{0.61})_{\Sigma=3.58}Sn_{0.97}Te_{2.05}S_{2.02}$. (2) Do.; average electron microprobe analysis; corresponds to $(Pd_{5.38}Pt_{0.14})_{\Sigma=5.52}(Cu_{1.45}Ag_{1.23}Fe_{0.64})_{\Sigma=3.32}Sn_{1.02}Te_{2.10}S_{2.03}$.

Occurrence: In hydrothermally altered, sulfide-rich pods and stringers of coarse-grained to pegmatitic gabbronorite, in a sill-like body of micro-gabbronorite.

Association: Chalcopyrite, telargpalite, moncheite, sperrylite, tulameenite, kotulskite, irarsite, Cl-rich ferropargasite.

Distribution: From the Nadezhda ("Hope") Pd-Pt-Ag deposit, Lukkulaisvaara layered intrusion, northern Karelia, northwestern Russia.

Name: For the *Oulanka* river near the ore deposit.

Type Material: A.E. Fersman Mineralogical Museum, Moscow, Russia.

References: (1) Barkov, A.Y., Yu.P. Men'shikov, V.D. Begizov, and A.I. Lednev (1996) Oulankaite, a new platinum-group mineral from the Lukkulaisvaara layered intrusion, northern Karelia, Russia. Eur. J. Mineral. 8, 311-316. (2) (1996) Amer. Mineral., 81, 1514 (abs. ref. 1). (3) Barkov, A.Y., M.E. Fleet, R.F. Martin, and M. Tarkian (2004) Compositional variations in oulankaite and a new series of argentoan oulankaite from the Lukkulaisvaara layered intrusion, Northern Russian Karelia. Can. Mineral., 42, 439-453.