

**Crystal Data:** Orthorhombic, pseudotetragonal. *Point Group:* 222. As aggregates and single grains, to 1 mm; in fine disseminations. *Twinning:* Common and complex,  $\perp$  (101), may result in geniculated forms.

**Physical Properties:** Hardness = n.d. VHN = 383–415 (40–50 g load). D(meas.) = n.d. D(calc.) = 5.273

**Optical Properties:** Opaque. *Color:* In polished section, pale yellow. *Luster:* Metallic. *Pleochroism:* Weak, pale cream to pinkish cream. *Anisotropism:* Strong, from bluish to reddish. R<sub>1</sub>–R<sub>2</sub>: (400) 25.7–27.1, (420) 30.3–32.1, (440) 35.7–37.9, (460) 40.6–42.6, (480) 44.5–46.5, (500) 47.4–49.1, (520) 49.7–50.9, (540) 51.3–52.2, (560) 52.5–53.0, (580) 53.6–53.8, (600) 54.6–54.4, (620) 55.4–55.0, (640) 56.1–55.6, (660) 57.0–56.2, (680) 57.8–56.8, (700) 58.4–57.4

**Cell Data:** *Space Group:* C222.  $a = 9.3359(7)$   $b = 11.2185(10)$   $c = 9.4300(6)$   $Z = 4$

**X-ray Powder Pattern:** Zapolyarnyi mine, Russia. 2.85 (100), 1.803 (90), 1.795 (80), 1.654 (80), 3.28 (50), 2.10 (50), 2.33 (40)

Chemistry:	(1)	(2)	(3)	(4)
Ni	61.5	64.45	68.2	67.31
Fe	3.0	2.08		
Co	0.6	0.19		
S	35.0	32.85	32.7	32.69
Total	100.1	99.57	100.9	100.00

(1) Zapolyarnyi mine, Russia; by electron microprobe, corresponding to (Ni<sub>7.68</sub>Fe<sub>0.39</sub>Co<sub>0.08</sub>)<sub>Σ=8.15</sub>S<sub>8.00</sub>. (2) Do.; by electron microprobe, corresponding to (Ni<sub>8.58</sub>Fe<sub>0.29</sub>Co<sub>0.02</sub>)<sub>Σ=8.89</sub>S<sub>8.00</sub>. (3) Barberton district, South Africa; by electron microprobe, corresponding to Ni<sub>9.12</sub>S<sub>8.00</sub>. (4) Ni<sub>9</sub>S<sub>8</sub>.

**Occurrence:** In hydrothermal veins, or in peridotite with other nickel sulfides.

**Association:** Millerite, heazlewoodite, pentlandite, pyrrhotite, pyrite, bornite, chalcopyrite, magnetite.

**Distribution:** In Russia, from the Talnakh area, Noril'sk region, western Siberia, in the Zapolyarnyi [TL], Mayak, and other mines; at the Bazhenovo ultramafic massif, Middle Ural Mountains. From the Swat Valley, northwestern Pakistan. At the Amianthus mine, Kaapsche Hoop, Barberton, Transvaal, South Africa. From Bou Azzer, Morocco. At Fiskenaeset, Greenland. In Canada, in the Texmont mine, about 50 km south of Timmins, Ontario, and at the Orford nickel mine, Brompton Lake, Quebec. From near Moapa, Clark Co., Nevada, USA. At Mount Clifford, 54 km north-northwest of Leonora, Western Australia. Several other less-well-defined occurrences are known.

**Name:** In honor of Mikhail Nikolaevich Godlevskii (1902–1984), Russian economic geologist, Central Institute of Geological Exploration for Base and Precious Metals, Moscow, Russia.

**Type Material:** Institute of Geology; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 73000.

**References:** (1) Kulagov, E.A., T.L. Evstigneeva, and O.E. Yushko-Zakharova (1969) The new nickel sulfide godlevskite. *Geol. Rudn. Mestorozhd.* 11, 115–121 (in Russian). (2) (1970) *Amer. Mineral.*, 55, 317–318 (abs. ref. 1). (3) Fleet, M.E. (1987) Structure of godlevskite, Ni<sub>9</sub>S<sub>8</sub>. *Acta Cryst.*, C43, 2255–2257. (4) Fleet, M.E. (1988) Stoichiometry, structure and twinning of godlevskite and synthetic low-temperature Ni-excess nickel sulfide. *Can. Mineral.*, 26, 283–291. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 201.

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