Halamishite Ni_5P_4

Crystal Data: Hexagonal. *Point Group*: 6*mm*. As irregular gains to 20 μm.

Physical Properties: *Cleavage*: None. *Fracture*: n.d. *Tenacity*: Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 6.249

Optical Properties: [Opaque.] *Color*: Dark gray, white with a beige tint in reflected light. *Streak*: n.d. *Luster*: Metallic.
Optical Class: Moderately anisotropic and bireflectant.
R_1-R_2: (400) 40.3-34.5, (420) 41.5-35.2, (440) 42.5-36.3, (460) 43.7-37.3, (470) 44.3-36.6, (480) 44.8-35.8, (500) 46.2-39.6, (520) 47.7-40.7, (540) 48.9-41.9, (546) 49.2-42.1, (560) 50.0-42.7, (580) 50.9-43.7, (589) 51.3-44.1, (600) 51.7-44.5, (620) 52.4-45.3, (640) 53.0-45.8, (650) 53.3-46.1, (660) 53.6-46.5, (680) 54.2-46.9, (700) 55.0-47.5

Cell Data: Space Group: $P6_3mc$. a = 6.8184(4) c = 11.0288(8) Z = 4

X-ray Powder Pattern: Calculated pattern.
1.735 (100), 2.015 (88), 1.908 (77), 1.938 (69), 1.705 (58), 2.498 (57), 2.069 (57)

Chemistry:

	(1)	(2)
Ni	69.23	70.31
Fe	1.80	
P	29.59	29.69
Total	100.62	100.00

(1) Halamish Wadi, Southern Negev Desert, Israel; average of 3 electron microprobe analyses; corresponds to $(Ni_{4.90}Fe_{0.13})_{\Sigma=5.03}P_{3.97}$. (2) Ni_5P_4.

Occurrence: In a phosphide assemblage related to the Fe-Ni-P system in a pyrometamorphic rock (Hatrurim Formation).

Association: Murashkoite, zuktamrurite, transjordanite, transjordanite.

Distribution: Along the upper stream of the Halamish Wadi, Hatrurim Basin, southern Negev Desert, Israel.

Name: For the locality, the *Halamish* Wadi, Israel, were the mineral was found.

Type Material: Mineralogical Museum, Department of Mineralogy, St. Petersburg State University, Russia (19606).

References: (1) Britvin, S.N., M. Murashko, Y. Vapnik, Y.S. Polekhovsky, S.V. Krivovichev, O.S. Vereshchagin, V.V. Shilovskikh, N.S. Vlasenko, and M.G. Krzhizhanovskaya (2020) Halamishite, Ni_5P_4, a new terrestrial phosphide in the Ni-P system. Physics and Chemistry of Minerals, 47, 3. (2) (2020) Amer. Mineral., 105(10), 1601-1603 (abs. ref. 1).