Barringerite $(Fe, Ni)_2P$

Crystal Data: Hexagonal. *Point Group:* $\overline{6}m2$. As bands, 10–15 μm wide and several hundred μm long, consisting of individual grains less than 1 μm in diameter, along the contact between schreibersite and troilite.

Physical Properties: Hardness = > 7 VHN = 1097 (20 g load). D(meas.) = n.d. D(calc.) = 6.92

Optical Properties: [Opaque.] *Color:* White, similar to kamacite; bluish compared to schreibersite, in reflected light.
Optical Class: Uniaxial. *Anisotropism:* Noticeable; white to blue.
R: (Slightly higher than that of schreibersite; lower than that of kamacite).

Cell Data: *Space Group:* $P\overline{6}2m$. $a = 5.87(7)$ $c = 3.44(4)$ $Z = 3$

X-ray Powder Pattern: Synthetic Fe_2P.
2.237 (100), 1.28 (100), 1.21 (100), 1.10 (100), 2.048 (95), 1.920 (90), 1.694 (80)

Chemistry:

	(1)	(2)	(3)
Fe	44.3	75.1	76.22
Cr			0.73
Ni	33.9	0.04	2.85
Co	0.25	0.21	
P	21.8	22.8	20.21
Total	100.25	98.15	100.01

(1) Ollague meteorite; average of several analyses by electron microprobe, corresponding to $(Fe_{1.16}Ni_{0.84}Co_{0.01})_{\Sigma=2.01}P$. (2) Y-793274 meteorite; by electron microprobe. (3) China; corresponding to $(Fe_{2.09}Ni_{0.07}Cr_{0.02})_{\Sigma=2.18}P$.

Occurrence: Along the contacts between schreibersite and troilite in a Fe–Ni meteorite (Ollague); as a single grain in a brecciated lunar meteorite of mixed mare and highland origin (Y-793274 meteorite); in the oxidation zone of a platinum-bearing Cu–Ni sulfide deposit (China).

Association: Kamacite, olivine, schreibersite, troilite (Ollague meteorite); plagioclase, glass (Y-793274 meteorite) schreibersite, wüstite, lawrencite (Canyon Diablo meteorite).

Distribution: In the Imilac (Ollague) pallasite meteorite [an extraterrestrial origin has been questioned]. In the Yamato-793274 meteorite, from the Moon. In the Canyon Diablo iron meteorite. Found in an unspecified mineral deposit in China.

Name: To honor Daniel Moreau Barringer (1860–1929), early proponent of the meteor impact origin of Meteor Crater, near Canyon Diablo, Arizona, USA.

Type Material: Nininger collection, Center for Meteorite Studies, Arizona State University, Tempe, Arizona, USA.

References: (1) Buseck, P.R. (1969) Phosphide from meteorites: barringerite, a new iron-nickel mineral. Science, 165, 169–171. (2) (1970) Amer. Mineral., 55, 317 (abs. ref. 1). (3) Chen Kegiao, Jin Zaimiao, and Peng Zhizhong (1983) The discovery of iron barringerite, (Fe_2P) in China. Scientia Geol. Sinica, 199–202 (in Chinese with English abs.). (4) (1984) Amer. Mineral., 69, 407 (abs. ref. 3). (5) (1984) Mineral. Abs., 35, 186–187 (abs. ref. 3). (6) Brandstätter, F., C. Koeberl, and G. Kurat (1991) The discovery of iron barringerite in lunar meteorite Y-793274. Geochim. Cosmochim. Acta, 55, 1173–1174. (7) Carlsson, B., M. Gölin, and S. Rundqvist (1973) Determination of the homogeneity range and refinement of the crystal structure of Fe_2P. J. Solid State Chem., 8, 57–67. (8) Fujii, H., S. Komura, T. Takeda, T. Okamoto, Y. Ito, and J. Akimitsu (1979) Polarized neutron diffraction study of Fe_2P single crystal. J. Phys. Soc. Japan, 46, 1616–1621.