Roaldite Fe_4N

Crystal Data: Cubic. *Point Group:* $4/m\ \overline{3}\ 2/m$ (synthetic Fe_4N is $\overline{4}3m$). As planar foils, to 2 μm thick but many mm long, forming bursts embedded in kamacite.

Physical Properties: *Tenacity:* Ductile. Hardness = n.d. VHN = 600–900 (estimated). D(meas.) = n.d. D(calc.) = 7.21 (synthetic).

Optical Properties: Opaque. *Color:* White in reflected light.
Optical Class: Isotropic.
R: n.d.

Cell Data: *Space Group:* $Pm3m$ (synthetic Fe_4N is $P\overline{4}3m$). $a = 3.79(4)$ $Z = 1$

X-ray Powder Pattern: Synthetic Fe_4N.
2.191 (100), 1.144 (85), 1.897 (75), 1.342 (65), 0.949 (45), 1.095 (40), 2.684 (20)

Chemistry:

	(1)	(2)
Fe	89.8	88.6
Co	n.d.	0.53
Ni	5.58	6.35
N	6.3	7.6
Total	101.68	103.08

(1) Jerslev meteorite; by electron microprobe, trace Co assumed; corresponds to $(Fe_{3.76}Ni_{0.22}Co_{0.02})_{\Sigma=4.00}N$. (2) Youndegin meteorite; by electron microprobe, corresponds to $(Fe_{3.72}Ni_{0.26}Co_{0.02})_{\Sigma=4.00}N$.

Occurrence: A rare accessory mineral in iron-nickel meteorites, probably formed by diffusion of nitrogen.

Association: Kamacite, cohenite, schreibersite, carlsbergite, daubreelite.

Distribution: In the Jerslev, Youndegin, and Canyon Diablo iron meteorites.

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Type Material: University of Copenhagen, Copenhagen, Denmark, 1977,540.

References: (1) Buchwald, V.F. and H.P. Nielsen (1981) Roaldite, a new nitride in iron meteorites. Lunar and Planetary Science, 12, 112–114. (2) (1981) Amer. Mineral., 66, 1100 (abs. ref. 1). (3) Dvoriankina, G.G. and Z.G. Pinsker (1958) An investigation of the structure of Fe_4N. Kristallografiya (Sov. Phys. Crystal.), 3, 439–444.