Harmunite $CaFe_2O_4$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As skeletal prismatic crystals, to 3 mm, displaying {100}, {110}, {210}, {011}, {001}, and {010}. Also as exsolution-like features in magnesioferrite.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. Hardness = 5.5 VHN = 655 (50 g load.) D(meas.) = n.d. D(calc.) = 4.404

Optical Properties: Opaque. *Color*: Black, light gray with red internal reflections in reflected light. *Streak*: n.d. *Luster*: n.d.
Optical Class: n.d.
R_1-R_2: (470) 21.10-20.60, (546) 19.20-20.65, (589) 18.45-19.30, (650) 17.75-18.70

Cell Data: *Space Group*: *Pnma*. *a* = 9.2183(3) *b* = 3.0175(1) *c* = 10.6934(4) Z = 4

X-ray Powder Pattern: Jabel (Mt.) Harmun, West Bank, Palestinian Autonomy, Israel.
2.6632 (100), 2.5244 (60), 2.6697 (52), 1.8335 (40), 2.5225 (35), 2.2318 (34), 1.8307 (27)

Chemistry:	(1)	(2)
TiO_2	0.15	
Fe_2O_3	71.94	74.01
FeO	4.14	
Cr_2O_3	0.38	
Al_2O_3	0.36	
CaO	26.15	25.99
MgO	0.06	.
Total	99.04	100.00

(1) Jabel (Mt.) Harmun, West Bank, Palestinian Autonomy, Israel; average of 13 electron microprobe analyses supplemented by Raman spectroscopy; corresponds to $Ca_{1.013}(Fe^{3+}_{1.957}Al_{0.015}Cr^{3+}_{0.011}Ti^{4+}_{0.004}Mg_{0.003})_{\Sigma=1.993}O_4$. (2) $CaFe_2O_4$.

Occurrence: In pyrometamorphic larnite pebbles of a pseudo-conglomerate, the cement of which consists of intensely altered larnite-bearing rocks, likely formed in the presence of sulfate melt.

Association: Srebrodolskite, magnesioferrite, larnite, fluorellestadite, ye'elimite, fluormayenite, gehlenite, ternesite, calciolangbeinite.

Distribution: From the Hatrurim Complex, southern slope of Jabel (Mt.) Harmun, Judean Desert, West Bank, Palestinian Autonomy, Israel.

Name: For Mt. Harmun, from where the first specimens were collected.

Type Material: In Russia, in the mineralogical collections, Saint Petersburg University (1/19518) and the A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow (4398/1).

References: (1) Galuskina, I.O., Y. Vapnik, B. Lazic, T. Armbruster, M. Murashko, and E.V. Galuskin (2014) Harmunite $CaFe_2O_4$: A new mineral from the Jabel Harmun, West Bank, Palestinian Autonomy, Israel. Amer. Mineral., 99, 965-975.