Simferite $Li(Mg,Fe^{3+},Mn^{3+})_2(PO_4)_2$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m* or *mm*2. As equant grains to 3 mm. Rare crystals, to 0.1 mm, are tabular, with {001}, {010}, {110}, {120}. *Twinning:* Common as simple interpenetration twins.

Physical Properties: *Cleavage:* Prominent on {010}, poor on {100}, intersecting at 87-90°. *Fracture:* Uneven to conchoidal. Hardness = n.d. VHN = 457(30) (100 g load). D(meas.) = 3.22-3.27 D(calc.) = 3.25

Optical Properties: Semitransparent. *Color:* Dark red to nearly black. *Streak:* Cinnamon-brown. *Luster:* Vitreous to greasy. *Optical Class:* Biaxial (+). α = 1.690-1.704 β = 1.702-1.716 γ = 1.712-1.726 2V(meas.) = 54°-60° *Pleochroism:* Intense, *X* = light brown to red; *Y* = brownish yellow to brown; *Z* = yellow to reddish yellow. *Orientation: X* = *c*, *Y* = *a*, *Z* = *b*. *Dispersion:* Strong, *r* > *v*.

Cell Data: *Space Group: Pbnm* or $Pbn2_1$. *a* = 4.7468(7) *b* = 10.101(2) *c* = 5.8992(7) Z = 2

X-ray Powder Pattern: Radionovskoye pegmatite field, Ukraine.
2.48 (10), 4.30 (9), 2.93 (8), 3.85 (6), 3.45 (6), 2.42 (6), 2.23 (6)

Chemistry:

	(1)	(2)
P_2O_5	51.90	51.00
Fe_2O_3	16.87	17.39
Mn_2O_3	9.84	14.83
MgO	15.78	12.36
CaO	0.00	0.08
Li_2O	[5.45]	[5.35]
Total	99.84	101.01

(1) Radionovskoye pegmatite field, Ukraine, electron microprobe analysis supplemented by spectroscopy, Li_2O calculated; corresponds to $Li_{1.00}(Mg_{1.09}Fe^{3+}_{0.57}Mn^{3+}_{0.34})_{\Sigma=2.00}(P_{1.01}O_4)_2$.
(2) Do.; corresponds to $Li_{0.98}(Mg_{0.85}Fe^{3+}_{0.60}Mn^{3+}_{0.52})_{\Sigma=1.97}(P_{1.00}O_4)_2$.

Occurrence: At the contact of a rare-earth-bearing granite pegmatite and phlogopitized ultramafic tremolite rock.

Association: Muscovite, quartz, oligoclase, albite, phlogopite, tourmaline, apatite.

Distribution: In the Radionovskoye pegmatite field, middle Berda River, Zaporozhe district, Ukraine.

Name: For the city of *Simfer*opol, Crimea, Ukraine, where the mineral was studied.

Type Material: A.E. Fersman Museum, Russian Academy of Sciences, Moscow, Russia.

References: (1) Yakubovich, O.V., V.V. Bairakov, and M.A. Simonov (1989) Crystal structure of simferite $Li(Mg,Fe^{3+},Mn^{3+})_2[PO_4]_2$. Doklady Acad. Nauk SSSR, 307, 1119-1122 (in Russian). (2) (1993) Amer. Mineral., 78, 452 (abs. ref. 1). (3) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union, 187-188. (4) Bayrakov, V.V., O.V. Yakubovich, M.A. Simonov, S.E. Borisovskiy, and T.A. Ziborova (2005) Simferite $Li(Mg,Fe^{3+},Mn^{3+})_2[PO_4]_2$, a new mineral. Mineral. Zh., 27(2), 112-120 (in Russian, English abstract). (5) (2006) Amer. Mineral., 91, 1206 (abs. ref. 4).