Perrierite-(La) $(La,Ce,Ca)_4Fe^{2+}(Ti,Fe^{3+})_4(Si_2O_7)_2O_8$

Crystal Data: Monoclinic. *Point Group:* 2/*m*. As simply terminated prismatic crystals to 1 mm, columnar along [010] or flattened on (001).

Physical Properties: *Cleavage:* Distinct on (001). *Fracture:* n.d. *Tenacity:* Brittle. Hardness = 6 D(meas.) = n.d. D(calc.) = 4.791

Optical Properties: Translucent to nearly opaque. *Color:* Black. *Streak:* Brown. *Luster:* Vitreous.
Optical Class: Biaxial (-). α =1.94(1) β= 2.020(15) γ = 2.040(15) 2V(meas) = 50(10)° 2V(calc) = 51° *Dispersion:* Very strong, $r < v$. *Pleochroism*: *Z* = dark brown; *Y* = brown; *X* = light yellow-brown. *Absorption*: Z > Y > X.

Cell Data: *Space Group: P2₁/a*. a =13.668(1) b = 5.6601(6) c = 11.743(1) β = 113.64(1)° Z = 2

X-ray Powder Pattern: Dellen quarry, near Mendig, Eifel Mts., Rhineland-Palatinate, Germany. 2.96 (100), 2.80 (50), 2.14 (50), 1.947 (50), 5.19 (40), 3.53 (40), 1.657 (40)

Chemistry:	(1)
CaO	3.26
La_2O_3	22.92
Ce_2O_3	19.64
Pr_2O_3	0.83
Nd_2O_3	2.09
MgO	0.25
MnO	2.25
FeO	3.16
Fe_2O_3	5.28
$A1_2O_3$	2.59
TiO_2	16.13
Nb_2O_5	0.75
SiO_2	20.06
Total	99.21

(1) Dellen quarry, near Mendig, Eifel Mts., Rhineland-Palatinate, Germany; average of 7 electron microprobe analyses, Fe^{2+}/Fe^{3+} ratio from structure analysis; corresponding to $(La_{1.70}Ce_{1.45}Nd_{0.15}Pr_{0.06}Ca_{0.70})_{\Sigma=4.06}(Fe^{2+}_{0.53}Mn_{0.38}Mg_{0.08})_{\Sigma=0.99}(Ti_{2.44}Fe^{3+}_{0.80}Al_{0.62}Nb_{0.07})_{\Sigma=3.93}Si_{4.04}O_{22}$.

Mineral Group: Chevkinite group.

Occurrence: In miarolitic cavities in sanidinite lava rock, probably pneumatolytic.

Association: Sanidine, phlogopite, pyrophanite, zirconoiite, jakobsite, magnetite, fluorcalciopyrochlore, zircon.

Distribution: In the Dellen quarry, near Mendig, Laacher See region, Eifel Mts., Rhineland-Palatinate (Rheinland-Pfalz), Germany.

Name: For the La-dominant member of the *perrierite* structure type.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia; 4059/1.

References: (1) Chukanov, N.V., G. Blass, I.V. Pekov, D.I. Belakovskiy, K.V. Van, R.K. Rastsvetaeva, and S.M. Aksenov, (2011) Perrierite-(La), $(La,Ce,Ca)_4(Fe^{2+},Mn)(Ti,Fe^{3+},Al)_4(Si_2O_7)_2O_8$ - a new mineral species from the Eifel volcanic region, Germany. Zap. Ross. Mineral. Obshch., 140(6), 34-44 (in Russian, English abstract). (2) (2013) Amer. Mineral., 98, 1081-1082 (abs. ref. 1).