Christofschäferite-(Ce) $(Ce,La,Ca)_4Mn(Ti,Fe^{2+})_3(Fe^{3+},Ti)(Si_2O_7)_2O_8$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As stubby prismatic crystals or isolated grains to 3 mm.

Physical Properties: *Cleavage:* None observed. *Tenacity:* Brittle. *Fracture:* Conchoidal. Hardness = 6 D(meas.) = 4.8(1) D(calc.) = 4.853

Optical Properties: Translucent. *Color:* Black. *Streak:* Brown. *Luster:* Resinous. **Optical Class:** Biaxial (-). α = 1.945(10) β = 2.015(10) γ = 2.050(10) 2V(meas.) = 70(10)° 2V(calc.) = 68° *Pleochroism:* Strong; very dark brown to light brown. *Absorption: Z > Y > X*.

Cell Data: Space Group: $P2_1/m$. a = 13.3722(4) b = 5.7434(1) c = 11.0862(2) β = 100.580(2)° Z = 2

X-ray Powder Pattern: Wingertsbergwand, Eifel Mountains, Rhineland-Palatinate, Germany. 2.730 (100), 3.169 (81), 3.480 (78), 4.64(65), 2.169 (46), 1.737 (46), 3.095 (43), 4.90 (39)

Chemistry:

	(1)
CaO	2.61
La_2O_3	19.60
Ce_2O_3	22.95
Pr_2O_3	0.56
Nd_2O_3	2.28
MgO	0.08
MnO	4.39
FeO	4.18
Fe_2O_3	3.11
Al_2O_3	0.08
TiO_2	19.02
Nb_2O_5	0.96
SiO_2	9.38
Total	99.20

(1) Wingertsbergwand, Eifel Mountains, Rhineland-Palatinate, Germany; average of 5 electron microprobe analyses, Fe^{2+}:Fe^{3+} = 3:2, from structural analysis, corresponds to $(Ce_{1.72}La_{1.48}Nd_{0.17}Pr_{0.04}Ca_{0.57})_{\Sigma=3.98}Mn^{2+}_{0.76}Fe^{2+}_{0.72}Mg_{0.02}Ti_{2.935}Fe^{3+}_{0.48}Al_{0.02}Nb_{0.09}Si_{3.98}O_{22}$.

Mineral Group: Chevkinite group.

Occurrence: A metasomatic reaction product between Mn-rich rock and alkali basalt, found in a volcanic ejectum.

Association: Orthoclase, rhodonite, bustamite, tephroite, zircon, fluorapatite, pyrophanite, jacobsite.

Distribution: From Wingertsbergwand (Wingertsberg Mt.) of the Laacher See volcano near Mendig, Eifel Mountains, Rhineland-Palatinate (Rheinland-Pfalz), Germany.

Name: Honors Christof Schäfer (b. 1961), a German mineral collector, who collected the first specimens.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia; 4227/1.

References: (1) Chukanov, N.V., S.M. Aksenov, R.K. Rastsvetaeva, D.I. Belakovskiy, J. Göttlicher, S.N. Britvin, and S. Möckel (2012) Christofschäferite-(Ce), $(Ce,La,Ca)_4Mn^{2+}(Ti,Fe^{3+})_3(Fe^{3+},Fe^{2+},Ti)(Si_2O_7)_2O_8$, a new chevkinite-group mineral from the Eifel area, Germany. Novye dannye o mineralakh, 47, 33-42 (in English). (2) (2013) Amer. Mineral., 98, 2201 (abs. ref. 1).