Ferriperbøeite-(La) $(CaLa_3)(Fe^{3+}Al_2Fe^{2+})[Si_2O_7][SiO_4]_3O(OH)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As anhedral grains to 0.3 mm and granular aggregates to 1.5 mm in concentrically zoned, ovoid nodules.

Physical Properties: *Cleavage*: Good on {100} and imperfect on {001}. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = ~6 D(calc.) = 4.510 Nonfluorescent.

Optical Properties: Translucent. *Color*: Brownish black, dark gray in reflected light. *Streak*: Brown. *Luster*: Vitreous.
Optical Class: Biaxial (+). α = 1.788(5) β = 1.790(5) γ = 1.810(5) 2V(meas.) = 40(10)° 2V(calc.) = 35° *Pleochroism*: Weak, *X* = nearly colorless in thin grains to pale brownish in thicker ones, *Y* and *Z* = greenish brown. *Absorption*: *Z* > *Y* > *X*. *Anisotropy*: Weak.
R_1-R_2: (470) 8.0-8.5, (546) 7.9-8.4, (589) 7.8-8.3, (650) 7.8-8.4

Cell Data: *Space Group: P*2_1/*m*. *a* = 8.9458(2) *b* = 5.7297(1) *c* = 17.6192(3) β = 115.950(2)° Z = 2

X-Ray Diffraction Pattern: Mochalin Log REE deposit, Chelyabinsk Oblast', South Urals, Russia. 3.003 (100), 15.81 (72), 2.636 (60), 3.521 (53), 4.700 (43), 2.868 (39), 2.687(33)

Chemistry:

	(1)		(1)
CaO	4.91	FeO	[3.04]
MnO	1.07	Fe_2O_3	[5.31]
La_2O_3	23.75	TiO_2	0.19
Ce_2O_3	19.69	SiO_2	27.47
Pr_2O_3	0.85	F	0.11
Nd_2O_3	1.48	H_2O	[1.61]
MgO	1.47	–O = F	0.05
Al_2O_3	10.68	total	101.58

(1) Mochalin Log *REE* deposit, Chelyabinsk Oblast', South Urals, Russia; average electron microprobe analysis, Fe^{3+}:Fe^{2+} from charge balance, H_2O by stoichiometry; corresponds to $(Ca_{0.95}La_{1.58}Ce_{1.30}Nd_{0.10}Pr_{0.06})_{\Sigma=3.99}(Al_{2.27}Fe^{3+}_{0.72}Fe^{2+}_{0.46}Mg_{0.40}Mn_{0.16}Ti_{0.03})_{\Sigma=4.04}Si_{4.96}O_{20}[(OH)_{1.94}F_{0.06}]$.

Mineral Group: Gatelite supergroup.

Occurrence: Nodules of the deposit have a contact metasomatic origin, probably formed during fenitization of granitic pegmatites in the exocontact of an alkaline intrusion.

Association: Perbøeite-(La), allanite-(Ce), allanite-(La), bastnäsite-(Ce), bastnäsite-(La), ferriallanite-(Ce), ferriallanite-(La), ferriperbøeite-(Ce), perbøeite-(Ce), törnebohmite-(Ce), törnebohmite-(La).

Distribution: At the Mochalin Log *REE* deposit, 14 km north of Kyshtym, Chelyabinsk Oblast', South Urals, Russia.

Name: The suffix indicates the La-analogue of *ferriperbøeite*-(Ce).

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (5253/1, 96276).

References: (1) Kasatkin, A.V., N.V. Zubkova, I.V. Pekov, N.V. Chukanov, R. Škoda, Y.S. Polekhovsky, A.A. Agakhanov, D.I. Belakovskiy, A.M. Kuznetsov, S.N. Britvin, and D.Y. Pushcharovsky (2020) The mineralogy of the historical Mochalin Log REE deposit, South Urals, Russia. Part I. New gatelite-group minerals ferriperbøeite-(La), $(CaLa_3)(Fe^{3+}Al_2Fe^{2+})[Si_2O_7][SiO_4]_3O(OH)_2$ and perbøeite-(La), $(CaLa_3)(Al_3Fe^{2+})[Si_2O_7][SiO_4]_3O(OH)_2$. Mineral. Mag., 84, 593-607.