Stronadelphite $Sr_5(PO_4)_3F$

Crystal Data: Hexagonal. *Point Group*: 6/*m*. As hexagonal, prismatic to acicular crystals to 2 mm, in sheaf-like clusters to 2 mm embedded in natrolite.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = 5 D(meas.) = n.d. D(calc.) = 3.915 Cream-colored fluorescence under SW UV.

Optical Properties: Transparent. *Color*: Colorless with a pale greenish tint. *Streak*: White. *Luster*: Vitreous.
Optical Class: Uniaxial (-). ω = 1.630(1) ε = 1.623(1)

Cell Data: *Space Group*: $P6_3/m$. a = 9.845(7) c = 7.383(4) Z = 2

X-ray Powder Pattern: Belovitovoye pegmatite, Kirovskii mine, Mt. Kukisvumchorr, Russia. 2.940 (100), 2.009 (50), 1.955 (45), 3.21 (40), 2.823 (35), 3.71 (30), 1.500 (30)

Chemistry:

	(1)	(2)
Na_2O	0.10	
CaO	2.49	
SrO	62.72	69.83
BaO	2.40	
La_2O_3	0.34	
Ce_2O_3	0.22	
ThO_2	0.28	
P_2O_5	29.02	28.69
F	1.45	2.56
H_2O	[0.54]	
$–O = F_2$	0.61	1.08
Total	98.95	100.00

(1) Belovitovoye pegmatite, Kirovskii mine, Mt. Kukisvumchorr, Russia; average electron microprobe analysis, H_2O calculated, F by ion-selective method; corresponds to $(Sr_{4.46}Ca_{0.33}Ba_{0.12}Na_{0.02}La_{0.02}Ce_{0.01}Th_{0.01})_{\Sigma=4.97}P_{3.01}O_{12}[F_{0.56}(OH)_{0.44}]_{\Sigma=1}$. (2) $Sr_5(PO_4)_3F$.

Mineral Group: Apatite supergroup, apatite group.

Occurrence: From hydrothermal alteration of peralkaline pegmatite is a sinuous and branched vein cross-cutting inequigranular nepheline syenite in an alkaline massif.

Association: Natrolite, microcline, aegirine, pectolite, lamprophyllite, belovite-(Ce), belovite-(La), gaidonnayite, nenadkevichite, komarovite, manganokukisvumite, epididymite, sphalerite, neotocite.

Distribution: From the Belovitovoye peralkaline pegmatite, Kirovskii apatite mine, Mt. Kukisvumchorr, Khibiny alkaline complex, Kola peninsula, Russia [TL]. Similar material at Mt. Alluaiv, Lovozero complex, Kola peninsula, Russia, as rims on fluorapatite.

Name: After the chemical element *stron*tium and *adelfós*, Greek for ‘‘brother’’, as the full strontium analogue of fluorapatite, the most widespread member of the apatite supergroup.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (3693/1.).

References: (1) Pekov, I.V., S.N. Britvin, N.V. Zubkova, D.Yu. Pushcharovsky, M. Pasero, and S. Merlino (2010) Stronadelphite, $Sr_5(PO_4)_3F$, a new apatite-group mineral. Eur. J. Mineral., 22, 869-874. (2) Xue, W., K. Zhai, C-C. Lin, and S. Zhai (2018) Raman spectroscopic study of stronadelphite $Sr_5(PO_4)_3F$ at various temperatures. Vibrational Spectroscopy 98, 123-127. (3) Pasero, M., A.R. Kampf, C. Ferraris, I.V. Pekov, J. Rakovan, and T.J. White (2010) Nomenclature of the apatite supergroup minerals. Eur. J. Mineral., 22, 163-179.