Fluor-elbaite $Na(Li_{1.5}Al_{1.5})Al_6(Si_6O_{18})(BO_3)_3(OH)_3F$

Crystal Data: Hexagonal. *Point Group*: 3*m*. Prismatic crystals display {10$\bar{1}$ 0} and {11$\bar{2}$ 0} with striated faces and are terminated by {0001}, to 2.3 cm.

Physical Properties: *Cleavage*: [Poor/indistinct on {0001}.] *Fracture*: Sub-conchoidal. *Tenacity*: Brittle. Hardness = 7.5 D(meas.) = n.d. D(calc.) = 3.091-3.123

Optical Properties: Transparent. *Color*: Blue-green. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Uniaxial (–). ω = 1.648(2) ε = 1.629(2) *Pleochroism*: *O* = green to bluish green; *E* = pale green.

Cell Data: *Space Group*: *R*3*m*. *a* = 15.8933(2) *c* = 7.1222(1) Z = 3

X-ray Powder Pattern: Cruzeiro mine, São José da Safira, Minas Gerais, Brazil.
2.568 (100), 2.939 (92), 3.447 (67), 3.974 (58), 2.031 (57), 4.200 (49), 1.444 (32)

Chemistry:	(1)		(1)
SiO_2	37.48	K_2O	0.06
Al_2O_3	37.81	F	1.49
FeO	3.39	B_2O_3	10.83
MnO	2.09	Li_2O	1.58
ZnO	0.27	H_2O	[3.03]
CaO	0.34	$-O = F_2$	0.63
Na_2O	2.51	Total	100.25

(1) Cruzeiro mine, São José da Safira, Minas Gerais, Brazil; average of 10 electron microprobe analyses supplemented by secondary-ion mass and Mössbauer spectrometry, H_2O calculated from stoichiometry; corresponds to $^{X}(Na_{0.78}\square_{0.15}Ca_{0.06}K_{0.01})^{Y}(Al_{1.15}Li_{1.02}Fe^{2+}_{0.46}Mn^{2+}_{0.28}Zn_{0.03})^{Z}Al_6\ ^{T}(Si_{6.02}O_{18})^{B}(BO_3)_3{}^{V}(OH)_3{}^{W}[F_{0.76}(OH)_{0.24}]$.

Polymorphism & Series: Solid-solution exists with elbaite and tsilaisite.

Mineral Group: Tourmaline supergroup, alkali group, subgroup 2.

Occurrence: Formed in or near miarolitic cavities by late-stage hydrothermal solutions in a zoned granitic pegmatite.

Association: Quartz, muscovite, lepidolite, spodumene, spessartine, beryl.

Distribution: From the Cruzeiro mine, São José da Safira and the Urubu mine, Itinga, Minas Gerais, Brazil.

Name: As an *elbaite* with dominant *fluor*ine in the W site.

Type Material: Museum of Mineralogy, Earth Sciences Department, Sapienza University, Rome, Italy (33045) and the Department of Natural History, Royal Ontario Museum, Toronto, Canada (M56418).

References: (1) Bosi, F., G.B. Andreozzi, H. Skogby, A.J. Lussier, Y. Abdu, and F.C. Hawthorne (2013) Fluor-elbaite, $Na(Li_{1.5}Al_{1.5})Al_6(Si_6O_{18})(BO_3)_3(OH)_3F$, a new mineral species of the tourmaline supergroup. Amer. Mineral., 98, 297-303.