Caryochroite $(Na, Sr)_3(Fe^{3+}, Mg)_{10}Ti_2Si_{12}O_{37}(H_2O, O, OH)_{17}$

Crystal Data: Monoclinic. *Point Group*: n.d. Forms centimetric crusts of submicrometric {001} lamellae, elongate along [010], in spheroidal masses.

Physical Properties: *Cleavage*: Good on {001}. *Tenacity*: Brittle, aggregates are ductile. *Fracture*: Conchoidal. Hardness = 2.5 D(meas.) = 2.990(5) D(calc.) = 3.076

Optical Properties: Opaque. *Color*: Hazel-brown, dark brown in transmitted light. *Streak*: Pale brownish yellow. *Luster*: Dull to waxy. *Optical Class*: Biaxial (-). $\alpha < 1.700$ $\beta = 1.745(5)$ $\gamma = 1.775(5)$ 2V(meas.) = 75(10)° *Pleochroism*: *Z* = brown, *X* = *Y* = dark brown. *Absorption*: *X* = *Y* > *Z*. *Orientation*: *Y* = *a*, *Z* = *b*.

Cell Data: *Space Group*: n.d. $a = 16.47(2)$ $b = 5.303(6)$ $c = 24.39(3)$ $\beta = 93.5(2)°$ Z = 2

X-Ray Diffraction Pattern: Umbozero mine, Mt Alluaiv, Lovozero massif, Kola Peninsula, Russia. 12.1 (100), 13.3 (30), 14.1 (20), 2.631 (13), 2.692 (12), 4.38 (10), 2.968 (8)

Chemistry:

	(1)
SiO_2	35.20
TiO_2	7.47
Al_2O_3	0.66
Fe_2O_3	32.31
FeO	1.35
MgO	2.32
SrO	3.21
MnO	2.98
Na_2O	1.84
K_2O	0.61
CaO	1.15
H_2O	9.17
Total	98.27

(1) Umbozero mine, Mount Alluaiv, Lovozero massif, Kola Peninsula, Russia; average electron microprobe analysis supplemented by Mössbauer and IR spectroscopy, H_2O by TGA; corresponds to $(Na_{1.19}Sr_{0.62}Ca_{0.41}Mn_{0.35}K_{0.26})_{\Sigma=2.83}(Fe^{3+}_{7.98}Mg_{1.15}Mn_{0.49}Fe^{2+}_{0.38})_{\Sigma=10.00}(Ti_{1.87}Fe^{3+}_{0.13})_{\Sigma=2.00}(Si_{11.74}Al_{0.26})_{\Sigma=12.00}O_{54.10}H_{20.40}$.

Occurrence: Product of the supergene alteration of an unidentified Fe^{2+}-rich protophase in cavities in the albite zone of a pegmatite.

Association: Albite, elpidite, epididymite, quartz, natrolite, pyrite, galena, sphalerite, bitumen.

Distribution: From dumps of the Umbozero mine, Mount Alluaiv, Lovozero massif, Kola Peninsula, Russia.

Name: From the Greek for "nut" and "color" in allusion to its hazel-brown color.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (3313/1).

References: (1) Kartashov, P.M., G. Ferraris, S.V. Soboleva, and N.V. Chukanov, (2006) Caryochroite, a new heterophyllosilicate mineral species related to nafertisite, from the Lovozero massif, Kola Peninsula, Russia. Can. Mineral., 44, 1331-1339.