Georgbokiite $Cu_5O_2(SeO_3)_2Cl_2$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As complex equant to short prismatic crystals, with large {100}, {010}, {111}, {131}, 15 other forms, to 0.3 mm.

Physical Properties: *Cleavage:* Perfect on {100} and {010}. *Tenacity:* Sectile. Hardness = n.d. VHN = 215 (10 g load). D(meas.) = n.d. D(calc.) = 4.88

Optical Properties: Transparent. *Color:* Chestnut-brown to dark brown. *Streak:* Yellowish brown. *Luster:* Vitreous to adamantine.
Optical Class: Biaxial (–). *Pleochroism:* Distinct; X = yellowish brown, Y = straw-yellow; Z = dark brown. *Orientation:* $Y = b$; $X \wedge a = 24°$. *Absorption:* $Z > X > Y$. $\alpha = 2.06(2)$ $\beta = 2.11(2)$ $\gamma = 2.15(2)$ 2V(meas.) = 70° 2V(calc.) = 82°

Cell Data: *Space Group:* $P2_1/c$. $a = 6.030(1)$ $b = 13.744(3)$ $c = 5.562(1)$ $\beta = 95.75(1)°$ Z = 2

X-ray Powder Pattern: Tolbachik volcano, Russia.
2.990 (100), 2.296 (95), 2.963 (94), 6.88 (68), 2.566 (67), 5.511 (50), 2.265 (28)

Chemistry:

	(1)	(2)
SeO_2	33.09	32.90
CuO	58.17	58.96
ZnO	0.22	
Cl	10.96	10.51
$-O = Cl_2$	2.47	2.37
Total	99.97	100.00

(1) Tolbachik volcano, Russia; by electron microprobe, average of 13 analyses; corresponds to $(Cu_{4.92}Zn_{0.02})_{\Sigma=4.94}O_{1.91}(SeO_3)_{2.01}Cl_{2.08}$. (2) $Cu_5O_2(SeO_3)_2Cl_2$.

Occurrence: A rare fumarolic sublimate.

Association: Burnsite, chloromenite, sofiite, ilinskite, cotunnite, halite, moissanite.

Distribution: From the Tolbachik fissure volcano, Kamchatka Peninsula, Russia.

Name: To honor Professor Georgiy Borisovich Bokii (1909–2001), Institute of Geology of Ore Deposits, Moscow, Russia, for his work in mineralogy and crystal chemistry.

Type Material: Mineralogy Museum, St. Petersburg University; Mining Institute, St. Petersburg, Russia.

References: (1) Vergasova, L.P., T.F. Semenova, S.K. Filatov, S.V. Krivovichev, R.R. Shuvalov, and V.V. Ananiev (1999) Georgbokiite $Cu_5O_2(SeO_3)_2Cl_2$ – a new mineral from volcanic sublimates. Doklady Acad. Nauk SSSR, 364, 527–531 (in Russian). (2) Krivovichev, S.V., R.R. Shuvalov, T.F. Semenova, and S.K. Filatov (1999) Crystal chemistry of inorganic compounds based on chains of oxocentered tetrahedra. Part 3. Crystal structure of georgbokiite, $Cu_5O_2(SeO_3)_2Cl_2$. Zeits. Krist., 214, 135–138. (3) (2000) Amer. Mineral., 85, 627 (abs. refs. 1–2).