Epifanovite $NaCaCu_5(PO_4)_4[AsO_2(OH)_2]\cdot 7H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Tabular pseudo-tetragonal crystals display {100}, {010}, and {001}.

Physical Properties: *Cleavage*: Perfect on (001), good on (100) and (010). *Tenacity*: Brittle. *Fracture*: Stepped. Hardness = 3 D(meas.) = 3.65(3) D(calc.) = 3.73 Dissolves in 10% HCl.

Optical Properties: Transparent. *Color*: Turquoise blue, green in transmitted light.
Streak: Pale blue. *Luster*: Vitreous.
Optical Class: Biaxial (-). α = 1.708(5) β = 1.730(5) γ = 1.735(5) 2V(meas.) = 40-45(5)° 2V(calc.) = 50° *Dispersion*: None. *Orientation*: *X* = *a*, *Y* = *b*.

Cell Data: *Space Group*: $P2_1/m$. *a* = 9.6911(8) *b* = 9.7547(9) *c* = 9.9632(14) β = 102.237(10)° Z = 2

X-ray Powder Pattern: Këster deposit, Arga-Ynnykh-Khai massif, NE Yakutia, Russia.
9.73 (100), 3.072 (43), 6.79 (35), 3.061 (24), 3.003 (24), 4.355 (12), 2.698 (11)

Chemistry:

	(1)	(2)
Na_2O	3.04	3.02
K_2O	0.31	
CaO	4.42	5.46
CuO	38.66	38.70
ZnO	0.49	
P_2O_5	28.72	27.62
As_2O_5	8.95	11.18
H_2O	9.60	17.02
Cl	0.05	
$-O = Cl_2$	0.01	.
Total	99.23	100.00

(1) Këster deposit, Arga-Ynnykh-Khai massif, NE Yakutia, Russia; average electron microprobe analysis supplemented by Raman spectroscopy and TGA; corresponds to $(Na_{0.94}K_{0.06})_{\Sigma=1.00}(Ca_{0.82}Na_{0.08})_{\Sigma=0.90}(Cu_{5.04}Zn_{0.06})_{\Sigma=5.10}(PO_4)_4[(As_{0.81}P_{0.19})_{\Sigma=1.00}(O_{1.92}OH_{2.06}Cl_{0.02})_{\Sigma=4.00}]\cdot 7.37H_2O$.
(2) $NaCaCu_5(PO_4)_4[AsO_2(OH)_2]\cdot 7H_2O$.

Occurrence: A secondary low-temperature mineral formed by alteration of primary minerals in a quartz-phosphate mass ~5 m in diameter within greisenized cassiterite-bearing granodiorite.

Association: Copper, arsenolite, tobermorite, slavkovite, libethenite, pseudomalachite, fluorapatite.

Distribution: From the Këster Sn-Ta deposit, Arga-Ynnykh-Khai massif, NE Yakutia, Russia.

Name: Honors Porphiriy Prokopievich Epifanov, Russian geologist, the discoverer of the Këster, Ege-Khaya, and others tin deposits between 1936-1938.

Type Material: Mineralogical Museum, St. Petersburg State University, Russia (19658/1).

References: (1) Yakovenchuk, V.N., Ya.A. Pakhomovsky, N.G. Konoplyova, T.L. Panikorovskii, Yu.A. Mikhailova, V.N. Bocharov, S.V. Krivovichev, and G.Yu. Ivanyuk (2017) Epifanovite, $NaCaCu_5(PO_4)_4[AsO_2(OH)_2]\cdot 7H_2O$, a new mineral from Këster deposit (Sakha-Yakutia, Russia). Zap. Ross. Mineral. Obshch., 146(3), 30-39 (in Russian). (2) Panikorovskii, T.L., S.V. Krivovichev, V.N. Yakovenchuk, and G.Yu. Ivanyuk (2017) The crystal structure of epifanovite. Zap. Ross. Mineral. Obshch., 146(3), 39-50 (in Russian). (3) (2018) Amer. Mineral., 103, 2039-2040 (abs. refs. 1 & 2).