Kostylevite $K_2ZrSi_3O_9 \cdot H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As crystals elongated ‖ [001], showing {001}, {010}, {100}, and {011}. *Twinning:* On {100}.

Physical Properties: *Cleavage:* {110}, perfect. Hardness = ∼5 VHN = 428–435
D(meas.) = 2.74 D(calc.) = 2.79

Optical Properties: Transparent. *Color:* Colorless. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Orientation:* $X = b$; $Y \wedge c = 45°$. *Dispersion:* $r < v$, weak.
$\alpha = 1.595(2)$ $\beta = 1.598(2)$ $\gamma = 1.610(2)$ 2V(meas.) = 48°

Cell Data: *Space Group:* $P2_1/a$. $a = 13.171(4)$ $b = 11.717(4)$ $c = 6.565(2)$ $\beta = 105.26°$
Z = 2

X-ray Powder Pattern: Khibiny massif, Russia.
3.087 (100), 5.60 (60), 3.336 (53), 2.802 (53), 6.42 (47), 5.86 (31), 5.24 (31)

Chemistry:

	(1)	(2)
SiO_2	42.01	43.37
TiO_2	2.06	
ZrO_2	23.90	29.64
HfO_2	0.61	
Fe_2O_3	0.02	
CaO	0.00	
Na_2O	0.00	
K_2O	22.14	22.66
H_2O		4.33
Total	90.74	100.00

(1) Khibiny massif, Russia; by electron microprobe. Presence of H_2O is shown by strong IR absorption bands; if 1.00 H_2O is assumed to satisfy structural requirements and measured density, note the analysis will then sum to only ∼95% however. (2)$K_2ZrSi_3O_9 \cdot H_2O$.

Polymorphism & Series: Dimorphous with umbite.

Occurrence: In alkalic pegmatite in a differentiated alkalic massif.

Association: Umbite, wadeite, eudialyte, potassian feldspar, aegirine.

Distribution: In the valley of the Vuonnemiok River, Khibiny massif, Kola Peninsula, Russia.

Name: For Ekaterina Evtikhievna Kostyleva-Labuntsova (1894–1974), Russian mineralogist, Institute of Geology of Ore Deposits, Petrology, Mineralogy, and Geochemistry, Moscow, Russia.

Type Material: Geology Museum, Kola Branch, Academy of Sciences, Apatity; Mining Institute, St. Petersburg, 1634/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 82757.

References: (1) Khomyakov, A.P., A.A. Voronkov, L.I Polezhaeva, and N.N. Smol'yaninova (1983) Kostylevite, $K_4Zr_2Si_6O_{18} \cdot 2H_2O$, a new mineral. Zap. Vses. Mineral. Obshch., 112, 469–474 (in Russian). (2) Ilyushin, G.D., A.P. Khomyakov, N.V. Shumyatskaya, A.A. Voronkov, N.N. Nevskii, V.V. Ilyukhin, and N.V. Belov (1981) Crystal structure of a new natural zirconosilicate, $K_4Zr_2Si_6O_{18} \cdot 2H_2O$. Doklady Acad. Nauk SSSR, 256, 860–863 (in Russian). (3) (1984) Amer. Mineral., 69, 812 (abs. refs. 1 and 2).