Murataite $(Y, Na)_6(Zn, Fe^{3+})_5(Ti, Nb)_{12}O_{29}(O, F)_{14}$

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Crystal Data: Cubic. *Point Group:* $4/m\ \overline{3}\ 2/m$. As subhedral crystals, to 5 mm; granular.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 5–6.5 VHN = 782–870, 827 average (100 g load). D(meas.) = 4.50–4.69 D(calc.) = 4.64

Optical Properties: Opaque to translucent on thin edges. *Color:* Black; brown or yellow in transmitted light; gray in reflected light, with faint orange internal reflections. *Luster:* Submetallic.
Optical Class: Isotropic; slight anisotropism due to strain. n = 2.11–2.13 *Anisotropism:* Weak. *Bireflectance:* Slight.
R: (546) 13.7–13.3, (589) 13.1–12.7, (630) 12.7–12.3

Cell Data: *Space Group:* $F\overline{4}3m$. a = 14.886(2) Z = 4

X-ray Powder Pattern: St. Peters Dome, Colorado, USA.
2.858 (10), 1.746 (8), 1.489 (8), 2.468 (6), 1.432 (5), 1.138 (5), 8.51 (3)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SiO_2	0.64	0.34		Nb_2O_5	10.01	10.10	0.0
TiO_2	37.87	38.07	48.2	Fe_2O_3		3.99	
SnO_2	0.17	0.27		FeO	4.37		2.3
Y_2O_3	12.06	12.53	20.5	MnO	0.61	0.75	
Gd_2O_3	0.17	0.27		PbO	0.11		
Tb_2O_3		[0.16]		ZnO	12.45	11.32	16.2
Dy_2O_3	2.18	2.59		CaO	0.90	0.91	6.7
Ho_2O_3	0.57	0.95		Na_2O	5.80	6.10	5.9
Er_2O_3	3.09	2.83		F	6.55	7.11	0.0
Tm_2O_3	0.34	0.45		H_2O	0.55	[0.55]	
Yb_2O_3	2.96	3.11	0.7	$-O = F_2$	2.76	2.99	
Lu_2O_3	0.34	0.47		Total	[98.98]	[99.88]	100.5

(1) St. Peters Dome, Colorado, USA; by XRF, flame photometry, electron microprobe, semiquantitative spectrographic analysis, volumetric and microcoulumetric methods; after rejection of Ba 0.008%. (2) Do.; by electron microprobe, total Fe as Fe_2O_3, Tb_2O_3 interpolated, H_2O from (1); corresponds to $(Na_{3.97}Y_{2.24}RE_{1.15}Zn_{2.81}Fe^{3+}_{1.01}Ca_{0.33}Mn_{0.21})_{\Sigma=11.72}(Ti_{9.60}Nb_{1.53}Si_{0.11}Sn_{0.04})_{\Sigma=11.28}O_{32.11}F_{7.55}(OH)_{1.23}$. (3) Burpala massif, Russia.

Occurrence: A rare accessory mineral in samples from the dump of a prospect in a pegmatite subjected to alkali metasomatism (St. Peters Dome, Colorado, USA); in pegmatite in a differentiated alkalic massif (Burpala massif, Russia).

Association: Quartz, astrophyllite, microcline, albite, riebeckite, chlorite, zircon, aegirine, anatase, rutile, thorite, pyrochlore, xenotime, genthelvite, zincian davidite (St. Peters Dome, Colorado, USA); landauite, rutile, monazite, bastnäsite, brookite (Burpala massif, Russia).

Distribution: From the St. Peters Dome area, near Pikes Peak, El Paso Co., Colorado, USA. In the Burpala massif, 120 km north of Lake Baikal, eastern Siberia.

Name: To honor Kiguma Jack Murata (1909–), geochemist, U.S. Geological Survey, Menlo Park, California, USA, for his work on rare-earth chemistry.

Type Material: National Museum of Natural History, Washington, D.C., USA, 133319–133321.

References: (1) Adams, J.W., T. Botinelly, W.N. Sharp, and K. Robinson (1974) Murataite, a new complex oxide from El Paso County, Colorado. Amer. Mineral., 59, 172–176. (2) Portnov, A.M., L.S. Dubakina, and G.K. Krivokoneva (1981) Murataite in predicted association with landauite. Doklady Acad. Nauk SSSR, 261, 741–744 (in Russian). (3) Ercit, T.S. and F.C. Hawthorne (1995) Murataite, a UB_{12} derivative structure with condensed Keggin molecules. Can. Mineral., 33, 1223–1229.

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