Monazite-(Sm) $Sm(PO_4)$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As tabular crystals to 0.4 mm.

Physical Properties: *Cleavage*: One good direction. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 5.478

Optical Properties: Transparent to translucent. *Color*: Yellow. *Streak*: White. *Luster*: Vitreous to greasy.
Optical Class: Biaxial (+). $\alpha = 1.768(5)$ $\beta = 1.771(3)$ $\gamma = >1.808$ γ(calc.) = 1.818
2V(meas.) = 29(8)° *Orientation*: $X = b$, $Z \wedge c = 9°$ (β obtuse).

Cell Data: *Space Group*: $P2_1/n$. $a = 6.739(3)$ $b = 6.951(3)$ $c = 6.462(3)$ $\beta = 104.03(4)°$ $Z = 4$

X-ray Powder Pattern: Annie Claim #3, near Greer Lake, southeastern Manitoba, Canada.
3.065 (100), 2.857 (90), 4.164 (80), 3.264 (70), 4.647 (50), 5.191 (40), 3.492 (40B)

Chemistry:

	(1)	(2)		(1)	(2)
CaO	2.75		Dy_2O_3	1.18	
PbO	2.14		Yb_2O_3	0.02	
Y_2O_3	1.29		Lu_2O_3	0.05	
La_2O_3	2.10		ZrO_2	0.71	
Ce_2O_3	10.04		ThO_2	16.27	
Pr_2O_3	1.58		UO_2	0.62	
Nd_2O_3	6.03		SiO_2	1.53	
Sm_2O_3	13.02	71.07	P_2O_5	27.48	28.93
Gd_2O_3	12.06		Total	100.01	100.00
Tb_2O_3	1.14				

(1) Annie Claim #3, near Greer Lake, southeastern Manitoba, Canada; average of 3 electron microprobe analyses; corresponding to $(Sm_{0.18}Gd_{0.16}Th_{0.15}Ce_{0.15}Ca_{0.12}Nd_{0.09}La_{0.03}Y_{0.03}Pr_{0.02}Pb_{0.02}Tb_{0.02}Dy_{0.02}Zr_{0.02}U_{0.01})_{\Sigma=1.01}(P_{0.94}Si_{0.06})O_4$. (2) $Sm(PO_4)$.

Mineral Group: Monazite group.

Occurrence: From the inner intermediate zone of a lepidolite-subtype granitic pegmatite.

Association: Quartz, albite, lithian muscovite, manganocolumbite (Annie Claim); zircon, allanite, ilmenite, magnetite, hematite, fergusonite, xenotime (Shimo-ono).

Distribution: From the Annie Claim no. 3, near Greer Lake, near the Winnipeg River, southeastern Manitoba, Canada. From the Shimo-ono ilmenite-series granitic pegmatite, Ibaraki, Japan.

Name: The suffix designates the Sm-dominant analog of *monazite*-(Ce), *monazite*-(La), and *monazite*-(Nd).

Type Material: R.B. Ferguson Museum of Mineralogy, University of Manitoba, Winnipeg, Canada (M7181).

References: (1) Masau, M., P. Černý, M.A. Cooper, R. Chapman, and J.D. Grice (2002) Monazite-(Sm), a new member of the monazite group from the Annie claim no. 3 granitic pegmatite, southeastern Manitoba. Can. Mineral., 40, 1649-1655. (2) (2003) Amer. Mineral., 88(11), 1838 (abs. ref. 1). (3) Hoshino, M., Y. Watanabe, and S. Ishihara (2012) Crystal chemistry of monazite from the granitic rocks of Japan: petrogenic implications. Can. Mineral., 50(5), 1331-1346.