Armstrongite $CaZrSi_6O_{15}\cdot 2.5H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$, m, or 2. As crystals, to 2 cm, and aggregates. *Twinning:* Polysynthetic, by rotation about [100].

Physical Properties: *Cleavage:* Perfect on {001}, good on {100}. *Tenacity:* Very brittle. Hardness = 4.6 VHN = 310–330 D(meas.) = 2.562–2.593 D(calc.) = 2.71

Optical Properties: Semitransparent. *Color:* Dark to pale brown. *Luster:* Vitreous. *Optical Class:* Biaxial (–). *Orientation:* $Z = b$; $Y \wedge c = 5°$–$7°$. *Dispersion:* $r < v$. $\alpha = 1.563$ $\beta = 1.569$ $\gamma = 1.573$ 2V(meas.) = n.d.

Cell Data: *Space Group:* $C2/m$, Cm, or $C2$. $a = 14.04$ $b = 14.16$ $c = 7.81$ $\beta = 109°33'$ Z = 4

X-ray Powder Pattern: Khan-Bogdinskii massif, Mongolia.
4.26 (100), 3.05 (100), 6.60 (90), 3.80 (90), 7.05 (50), 2.995 (50), 1.947 (50)

Chemistry:

	(1)	(2)
SiO_2	60.12	61.64
TiO_2	0.12	
ZrO_2	19.80	21.07
Al_2O_3	0.60	
$(Y,RE)_2O_3$	0.55	
Fe_2O_3	1.31	
MgO	0.19	
CaO	9.15	9.59
Na_2O	0.18	
K_2O	0.14	
H_2O	7.90	7.70
P_2O_5	0.20	
Total	100.26	100.00

(1) Khan-Bogdinskii massif, Mongolia. (2) $CaZrSi_6O_{15}\cdot 2.5H_2O$.

Occurrence: In schlieren of alkalic granite pegmatite, at the contact of arfvedsonite granite with xenoliths of felsic volcanic rocks.

Association: Quartz, microcline, albite, aegirine, arfvedsonite, monazite, synchesite, titanite, other titanosilicates.

Distribution: In the Khan-Bogdinskii granitic massif, Gobi, Mongolia. In the Strange Lake complex, southeast of Lac Brisson, Quebec and Labrador, Newfoundland, Canada.

Name: Honoring Neil Alden Armstrong (1930–), American astronaut, first man to walk on the Moon.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia.

References: (1) Vladykin, N.V., V.I. Kovalenko, A.A. Kashaev, A.N. Sapozhnikov, and V.A. Pisarskaya (1973) A new mineral of calcium and zirconium, armstrongite. Doklady Acad. Nauk SSSR, 209, 1185–1188 (in Russian). (2) (1974) Amer. Mineral., 59, 208 (abs. ref. 1). (3) Kashaev, A.A. and A.N. Sapozhnikov (1978) Crystal structure of armstrongite. Kristallografiya (Sov. Phys. Crystal.), 23, 956–961 (in Russian).