Raygrantite $Pb_{10}Zn(SO_4)_6(SiO_4)_2(OH)_2$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. *Twinning*: Pervasive fish-tail type on $(12\bar{1})$. As bladed crystals elongated to 0.30 mm and striated along [001].

Physical Properties: *Cleavage*: Good on {120}. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = ~ 3 D(meas.) = n.d. D(calc.) = 6.374

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.915(7) β = 1.981(7) γ = 2.068(9) 2V(meas.) = 76(2)° 2V(calc.) = 85° *Dispersion*: *r* > *v*, strong. *Absorption*: *Z* > *Y* > *X*.

Cell Data: *Space Group*: $P\bar{1}$. a = 9.3175(4) b = 11.1973(5) c = 10.8318(5) α = 120.374(2)° β = 90.511(2)° γ = 56.471(2)° Z = 1

X-ray Powder Pattern: Evening Star mine, Big Horn Mountains, Maricopa County, Arizona, USA. 3.102 (100), 3.267 (63), 4.753 (56), 2.851 (35), 4.288 (32), 2.783 (31), 2.707 (31)

Chemistry:

	(1)
SiO_2	4.30
SO_3	16.49
PbO	74.91
ZnO	2.59
H_2O	[0.62]
Total	98.81

(1) Evening Star mine, Big Horn Mountains, Maricopa County, Arizona, USA; average of 18 electron microprobe analyses supplemented by Raman spectroscopy, H_2O calculated from structure; corresponds to $Pb_{9.81}Zn_{0.93}(S_{1.00}O_4)_6(Si_{1.05}O_4)_2(OH)_2$.

Mineral Group: Iranite group.

Occurrence: By alteration of sulfides in a hydrothermal quartz-galena-pyrite-chalcopyrite vein.

Association: Galena, anglesite, cerussite, lanarkite, leadhillite, mattheddleite, alamosite, hydrocerussite, caledonite, diaboleite, fornacite, iranite, phoenicochroite, cerussite, murdochite.

Distribution: From the Evening Star mine (previously called Old Queen Group or Silver Queen mine), Big Horn Mountains, Maricopa County, Arizona, USA.

Name: Honors Raymond W. Grant, retired professor of geology, Mesa Community College, Arizona, USA.

Type Material: Mineral Museum, University of Arizona (#19345) and in the collection of the RRUFF Project (R120151), Tucson, Arizona, USA.

References: (1) Yang, H., M.B. Andrade, R.T. Downs, R.B. Gibbs, and R.A. Jenkins (2016) Raygrantite, $Pb_{10}Zn(SO_4)_6(SiO_4)_2(OH)_2$, a new mineral isostructural with iranite, from the Big Horn Mountains, Maricopa County, Arizona, USA. Can. Mineral., 54(3), 625-634. (2) (2017) Amer. Mineral., 102, 1966 (abs. ref. 1).