Pseudograndreefite $Pb_6(SO_4)F_{10}$

Crystal Data: Orthorhombic, pseudotetragonal. *Point Group:* 222. Crystals are square, tabular on {010}, showing {010}, {100}, {001}, {210}, {012}, in subparallel aggregation, to 4 mm.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = ∼2.5
D(meas.) = 7.0(1) D(calc.) = 7.08 Soluble in H_2O.

Optical Properties: Transparent. *Color:* Colorless. *Streak:* White.
Luster: Subadamantine.
Optical Class: Biaxial (+). *Orientation:* $X = c$; $Y = a$; $Z = b$. *Dispersion:* $r > v$, strong.
$\alpha = 1.864(5)$ $\beta = 1.865(5)$ $\gamma = 1.873(5)$ 2V(meas.) = 30(3)° 2V(calc.) = 39°

Cell Data: *Space Group:* $F222$. $a = 8.5182(5)$ $b = 19.5736(11)$ $c = 8.4926(5)$ Z = 4

X-ray Powder Pattern: Grand Reef mine, Arizona, USA.
3.204 (100), 1.779 (70b), 2.999 (30), 2.212 (25), 1.364 (25b), 3.89 (20), 2.123 (20)

Chemistry:

	(1)	(2)
SO_3	4.7	5.24
PbO	84.9	87.57
F	13.1	12.42
$-O = F_2$	5.5	5.23
Total	97.2	100.00

(1) Grand Reef mine, Arizona, USA; by electron microprobe, H_2O shown absent by IR; corresponding to $Pb_{5.91}(S_{0.91}O_{3.29})F_{10.71}$. (2) $Pb_6(SO_4)F_{10}$.

Occurrence: In a vug isolated from acidic sulfate-rich solutions in the oxidized zone of a low-temperature Pb–Cu–Ag deposit.

Association: Grandreefite, laurelite, aravaipaite, galena, fluorite, anglesite, linarite, caledonite, quartz.

Distribution: From the Grand Reef mine, about six km northeast of Klondyke, Aravaipa district, Graham Co., Arizona, USA.

Name: From the Greek for *false*, and its relation to *grandreefite*.

Type Material: Natural History Museum, Los Angeles, California, 33608; National Museum of Natural History, Washington, D.C., USA, 166056.

References: (1) Kampf, A.R., P.J. Dunn, and E.E. Foord (1989) Grandreefite, pseudograndreefite, laurelite, and aravaipaite: four new minerals from the Grand Reef mine, Graham County, Arizona. Amer. Mineral., 74, 927–933.