Grundmannite $CuBiSe_2$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As grains to 250 μm.

Physical Properties: *Cleavage*: Perfect on {001}. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = 2-2.5 VHN = 53 (20 g load). D(meas.) = n.d. D(calc.) = 6.582

Optical Properties: Opaque. *Color*: Black. *Streak*: Black. *Luster*: Metallic.
Optical Class: n.d. Weakly bireflectant. *Pleochroism*: Weak; cream to light gray.
Anisotropism: Distinct, light brown to brown.
R_1-R_2: (400) 40.7-42.3, (420) 40.7-42.6, (440) 40.8-42.8, (460) 40.9-43.1, (480) 41.0-43.6, (500) 41.2-44.1, (520) 41.5-44.6, (540) 41.8-45.0, (560) 41.9-45.6, (580) 42.0-45.5, (600) 42.2-45.8, (620) 42.3-46.0, (640) 42.5-46.1, (660) 42.5-46.3, (680) 42.5-46.5, (700) 42.5-46.6

Cell Data: *Space Group*: *Pnma*. a = 6.6362(5) b = 4.2581(3) c = 15.3691(9) Z = 4

X-ray Powder Pattern: El Dragón selenide occurrence, Cordillera Oriental, southwestern Bolivia. 3.2746 (100), 3.3180 (70), 3.4901 (50), 2.3307 (50), 2.4923 (45), 2.1290 (35), 1.9927 (35)

Chemistry:	(1)	(2)
Cu	14.88	14.88
Hg	0.07	
Pb	1.23	
Ni	0.05	
Bi	44.9	48.55
Se	38.92	36.69
Total	100.05	100.00

(1) El Dragón selenide occurrence, Cordillera Oriental, southwestern Bolivia; average of 19 electron microprobe analyses; corresponds to $Cu_{0.99}(Bi_{0.91}Pb_{0.02})_{\Sigma=0.93}Se_{2.08}$. (2) $CuBiSe_2$.

Polymorphism & Series: Polymorphous with hansblockite.

Occurrence: A primary mineral, deposited from oxidizing low-temperature hydrothermal fluids at the waning stage of selenide formation in a telethermal vein.

Association: Watkinsonite, clausthalite, krut'aite-penroseite.

Distribution: From the El Dragón selenide occurrence, Cordillera Oriental, Department of Potosí, southwestern Bolivia.

Name: Honors Günter Grundmann (b. 1947), for his pioneering work on the El Dragón mine.

Type Material: Natural History Museum, London, England (BM 2015, 33) and Mineralogische Staatssammlung München, Museum "Reich der Kristalle," Munich, Germany (MSM 73584).

References: (1) Förster, H.-J., L. Bindi, and C.J. Stanley (2016) Grundmannite, $CuBiSe_2$, the Se-analog of emplectite, a new mineral from the El Dragón mine, Potosí, Bolivia. Eur. J. Mineral., 28(2), 467-477. (2) (2016) Amer. Mineral., 101, 2780 (abs. ref. 1).