Graţianite $MnBi_2S_4$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As thin lamellae or as flower-shaped blebs, to 20 μm.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. Hardness = n.d. D(meas.) = n.d. D(calc.) = 6.031

Optical Properties: Opaque. *Color*: Medium gray in reflected light. *Streak*: n.d. *Luster*: n.d. *Optical Class*: n.d. *Bireflectance*: Moderate (air); strong with bluish and brownish tints (oil). *Anisotropism*: Strong in shades of gray with purple and brown tints.

Cell Data: *Space Group*: *C*2/*m*. a = 12.6774(25) b = 3.9140(8) c = 14.7581(30) β = 115.31(3) ° Z = 4

X-ray Powder Pattern: Băiţa Bihor deposit, Bihor County, Romania.
3.448 (100), 2.731 (77), 2.855 (64), 3.637 (55), 3.644 (54), 3.062 (52), 3.335 (43)

Chemistry:	(1)	(2)
Ag	0.02	
Cu	0.42	
Pb	2.38	
Fe	2.92	
Mn	4.88	9.14
Cd	0.17	
Bi	67.76	69.53
Sb	0.35	
As	0.02	
Te	0.15	
Se	0.15	
S	21.10	21.33
Total	100.32	100.00

(1) Băiţa Bihor deposit, Bihor County, Romania; average of 20 electron microprobe analyses; corresponds to $(Mn_{0.541}Fe_{0.319}Pb_{0.070}Cu_{0.040}Cd_{0.009}Ag_{0.001})_{\Sigma=0.980}(Bi_{1.975}Sb_{0.018})_{\Sigma=1.993}(S_{4.008}Se_{0.012}Te_{0.007})_{\Sigma=4.027}$. (2) $MnBi_2S_4$.

Occurrence: In a geochemically complex, hydrothermal deposit of Bi-Pb-sulfosalts and Bi-chalcogenides.

Association: Cosalite, bismuthinite, chalcopyrite, tetradymite, gold, sphalerite.

Distribution: From the upper part of the Antoniu ore pipe, Băiţa Bihor (formerly Rézbánya) skarn deposit, Bihor County, Romania.

Name: Honors Graţian Cioflica (1927-2002), former Professor of Mineralogy and Ore Deposits, University of Bucharest, Romania for his work on the geology and mineralogy of the Băiţa Bihor skarn deposit.

Type Material: South Australian Museum, Adelaide, Australia (G33937).

References: (1) Ciobanu, C.L., J. Brugger, N.J. Cook, S.J. Mills, P. Elliott, G. Damian, and F. Damian (2014) Graţianite, $MnBi_2S_4$, a new mineral from the Băiţa Bihor skarn, Romania. Amer. Mineral., 99, 1063-1070.