

**Crystal Data:** Orthorhombic. *Point Group:*  $mm2$ . As equant crystals < 1 mm.  
*Twining:* Pervasive with six twin domains.

**Physical Properties:** *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* n.d. Hardness = 2.5-3  
VHN = 55-70, 67 average (20 g load). D(meas.) = n.d. D(calc.) = 6.334

**Optical Properties:** Opaque. *Color:* Black. *Streak:* n.d. *Luster:* Metallic.  
*Optical Class:* Weakly to moderately birefractant. *Pleochroism:* Weak, dark gray to dark green.  
R<sub>1</sub>-R<sub>2</sub>: (471.1) 26.4-26.9, (548.3) 24.7-25.0, (586.6) 24.4-24.8, (652.3) 24.5-24.8

**Cell Data:** *Space Group:*  $Pna2_1$ .  $a = 14.984(4)$   $b = 7.474(1)$   $c = 10.571(2)$   $Z = 4$

**X-Ray Diffraction Pattern:** Calculated pattern.  
3.0514 (100), 2.6868 (68), 1.8697 (37), 2.4615 (33), 3.0563 (31), 3.1925 (29), 2.7815 (29)

<b>Chemistry:</b>	(1)
Ag	76.12
Cu	0.30
Fe	0.09
Ge	2.31
As	4.07
<u>S</u>	<u>16.93</u>
Total	99.82

(1) Uchucchacua deposit, Oyon district, Cajatambo, Lima Department, Peru; average electron microprobe analysis; corresponds to  $(\text{Ag}_{7.98}\text{Cu}_{0.05})_{\Sigma=8.03}(\text{As}^{5+}_{0.31}\text{Ge}_{0.36}\text{As}^{3+}_{0.31}\text{Fe}^{3+}_{0.02})_{\Sigma=1.00}\text{S}_{5.97}$ .

**Mineral Group:** Argyrodite group.

**Occurrence:** In a hydrothermal Ag-Ge-Mn deposit.

**Association:** Proustite, argyrodite, galena, Mn-bearing calcite.

**Distribution:** From the Uchucchacua polymetallic deposit, Oyon district, Cajatambo, Lima Department, Peru.

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**Type Material:** Museum of Natural History, Florence, Italy (3213/I).

**References:** (1) Bindi, L., F.N. Keutsch, M. Morana, and F. Zaccarini (2017) Spryite,  $\text{Ag}_8(\text{As}^{3+}, \text{As}^{5+}, \text{Ge})\text{S}_6$ : Structure determination and inferred absence of superionic conduction of the first  $\text{As}^{3+}$ -bearing argyrodite. *Phys. Chem. Miner.*, 44, 75-82. (2) Bindi, L. and M. Morana (2021) Twining, superstructure and chemical ordering in spryite,  $\text{Ag}_8(\text{As}^{3+}_{0.50}\text{As}^{5+}_{0.50})\text{S}_6$ , at ultra-low temperature: An X-ray single-crystal study. *Minerals*, 11, 286, 1-9.