

**Kostovite****(Cu, Ag)AuTe<sub>4</sub>**

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**Crystal Data:** Orthorhombic. *Point Group:* n.d. As equant to slightly elongated grains, to 50  $\mu\text{m}$ . *Twinning:* Polysynthetic, fine lamellar, 0.1 to 20  $\mu\text{m}$  thick.

**Physical Properties:** *Cleavage:* Distinct in one direction. *Tenacity:* Brittle. Hardness = 2–2.5 VHN = 180–186 (25 g load). D(meas.) = 8.43 D(calc.) = [7.94]

**Optical Properties:** Opaque. *Color:* Grayish white; in polished section, pinkish creamy white. *Luster:* Metallic.

*Optical Class:* Biaxial (+). *Anisotropism:* Distinct; creamy white to creamy gray.  $R_1$ – $R_2$ : (400) 38.7–54.0, (420) 41.5–55.9, (440) 44.0–57.7, (460) 46.0–59.2, (480) 47.5–60.3, (500) 48.8–61.1, (520) 49.7–61.6, (540) 50.5–61.7, (560) 51.2–61.6, (580) 51.7–61.4, (600) 52.1–61.2, (620) 52.3–61.0, (640) 52.5–60.8, (660) 52.7–60.7, (680) 52.9–60.7, (700) 53.3–60.7

**Cell Data:** *Space Group:* n.d.  $a = 16.50(5)$   $b = 8.84(2)$   $c = 4.42(2)$   $Z = [4]$

**X-ray Powder Pattern:** Chelopech, Bulgaria. 3.03 (10), 2.10 (9), 2.93 (6), 5.03 (5), 3.36 (5), 3.24 (5), 2.23 (4)

<b>Chemistry:</b>	(1)	(2)	(3)	(4)
Au	25.2	27.2	27.37	25.55
Ag	0.4	0.5	4.03	
Cu	7.7	7.3	4.85	8.24
Fe		0.1		
Te	67.6	64.4	63.97	66.21
S		0.1		
Total	100.9	99.6	100.22	100.00

(1) Chelopech, Bulgaria; by electron microprobe, corresponding to  $(\text{Cu}_{0.92}\text{Ag}_{0.03})_{\Sigma=0.95}\text{Au}_{0.97}\text{Te}_{4.00}$ . (2) Bisbee, Arizona, USA; by electron microprobe; corresponding to  $(\text{Cu}_{0.90}\text{Ag}_{0.04})_{\Sigma=0.94}\text{Fe}_{0.01}\text{Au}_{1.09}(\text{Te}_{3.98}\text{S}_{0.02})_{\Sigma=4.00}$ . (3) Kochbulak deposit, Uzbekistan; by electron microprobe, corresponding to  $(\text{Cu}_{0.61}\text{Ag}_{0.30})_{\Sigma=0.91}\text{Au}_{1.11}\text{Te}_{4.00}$ . (4)  $\text{CuAuTe}_4$ .

**Occurrence:** From gold- and tellurium-bearing replacement copper deposits (Chelopech, Bulgaria; Campbell mine, Arizona, USA).

**Association:** Kesterite, tellurium, chalcopyrite, tennantite, barite (Chelopech, Bulgaria); tellurium, hessite, sylvanite (Buckeye Gulch, Colorado, USA); tellurium, altaite, calaverite, sylvanite, petzite, hessite, tellurantimony, melonite, chalcopyrite, tetrahedrite, sphalerite (Kochbulak deposit, Uzbekistan).

**Distribution:** From the Chelopech deposit, Sofia, Bulgaria [TL]. In the Campbell mine, Bisbee, Cochise Co., Arizona, and at Buckeye Gulch, near Leadville, Lake Co., Colorado, USA. From the Kochbulak gold deposit, Chatkal-Kuramin Mountains, eastern Uzbekistan. In the Guilaihuang gold deposit, Shandong Province, China. At the Ashanti gold deposit, Obuasi, Ghana.

**Name:** To honor Professor Ivan Kostov (1913– ), Bulgarian mineralogist, University of Sophia, Bulgaria.

**Type Material:** Geological Institute, Bulgarian Academy of Sciences; University of Sophia, Bulgaria; Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry, Moscow, Russia.

**References:** (1) Terziev, G. (1966) Kostovite, a gold–copper telluride from Bulgaria. *Amer. Mineral.*, 51, 29–36. (2) Kovalenker, V.A., N.V. Troneva, O.V. Kuz'mina, L.N. Vyal'sov, and P.M. Goloshchukov (1979) First occurrence of kostovite in the USSR. *Doklady Acad. Nauk SSSR*, 247, 1249–1252 (in Russian). (3) Van Tendeloo, G. and S. Amelinckx (1986) High-resolution electron-microscopic study of the modelated structure of kostovite  $(\text{Cu}_{1-x}\text{Ag}_x\text{Te}_4)$ . *Acta Cryst.*, 42, 121–130.

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