Anyuiite $Au(Pb,Sb)_2$

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Rounded, elongated to platy polymetallic grains, to 0.9 mm, with rhombic to square outline; typically fine-grained granular massive.

Physical Properties: *Tenacity:* Plastic, malleable. Hardness = n.d. VHN = 142–153, 146 average (20 g load); 101–104, 101 average (20 g load) antimonian. D(meas.) = n.d. D(calc.) = 13.49

Optical Properties: Opaque. *Color:* Silvery gray, becoming dull lead-gray on oxidation; in reflected light, pale silvery gray with faint creamy tint, becoming dark gray with blue-black overtones. *Luster:* Metallic.
Optical Class: Biaxial. *Anisotropism:* Weak, silvery gray to gray. *Bireflectance:* Barely noticable.
R_1–R_2: (400) —, (420) 50.3–56.7, (440) 52.9–59.0, (460) 55.0–60.7, (480) 56.2–62.0, (500) 57.7–62.4, (520) 58.3–63.2, (540) 59.3–63.9, (560) 59.9–64.6, (580) 60.7–65.1, (600) 61.4–65.6, (620) 62.1–66.0, (640) 62.1–66.1, (660) 63.0–66.2, (680) 63.4–66.5, (700) 63.7–66.8

Cell Data: *Space Group:* $I4/mcm$ (by analogy to synthetic $AuPb_2$). $a = 7.39(2)$ $c = 5.61(3)$ Z = 4

X-ray Powder Pattern: Bol'shoi Anyui River basin, Russia.
5.22 (60), 2.33 (30), 3.74 (20), 2.59 (20), 1.55 (20), 1.130 (20), 2.82 (10)

Chemistry:

	(1)	(2)	(3)
Ag	0.35		
Au	32.6	34.3	36.7
Pb	64.8	59.0	52.9
Sb	0.3	5.8	10.2
Total	98.05	99.1	99.8

(1) Bol'shoi Anyui River basin, Russia; by electron microprobe, corresponding to $(Au_{1.05}Ag_{0.02})_{\Sigma=1.07}(Pb_{1.98}Sb_{0.02})_{\Sigma=2.00}$. (2) Do.; corresponding to $Au_{1.05}(Pb_{1.71}Sb_{0.29})_{\Sigma=2.00}$. (3) Do.; corresponding to $Au_{1.10}(Pb_{1.51}Sb_{0.49})_{\Sigma=2.00}$.

Occurrence: In placer concentrates derived from small ultramafic-gabbroid masses in a dunite-harzburgite formation (Bol'shoi Anyui River basin, Russia); in gold concentrates from placers (Hunchun River, China).

Association: Lead, gold, ilmenite, titanian magnetite, chrome spinel, hematite, pyrite, chalcopyrite, apatite (Bol'shoi Anyui River basin, Russia); gold, lead, hunchinite, pyrite, pyrrhotite, magnetite, ilmenite (Hunchun River, China).

Distribution: From tributaries of the Bol'shoi Anyui River, Chukot Peninsula, far northeastern Siberia, Russia [TL]. In the Sandogou placers, along the Hunchun River, Jilin Province, China.

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Type Material: For its occurrence in the Bol'shoi Anyui River basin.

References: (1) Razin, L.V. and G.A. Siderenko (1989) Anyuiite $AuPb_2$ – A new intermetallic of gold and lead. Mineral. Zhurnal, 11(4), 88–90 (in Russian). (2) (1991) Amer. Mineral., 76, 299 (abs. ref. 1). (3) ?? (??) see below?? (4) (1990) Amer. Mineral., 75, 931 (abs. ref. 3).