

**Crystal Data:** Tetragonal. *Point Group:*  $\bar{4}2m$ ,  $4mm$ ,  $422$ , or  $4/m\ 2/m\ 2/m$ . As bladed crystals, to 1 mm; most commonly as grains.

**Physical Properties:** *Cleavage:* Parallel to grain elongation. *Tenacity:* Brittle. Hardness = n.d. VHN = 82–92, 88 average (10 g load). D(meas.) = 6.15 (synthetic). D(calc.) = 6.54

**Optical Properties:** Opaque. *Color:* Bronzy-black; in reflected light, rose-gray to pale lilac. *Luster:* Metallic. *Pleochroism:* Weak; pale gray with brownish lilac tint to dark gray. *Anisotropism:* Moderate; pale yellowish to very dark gray. R<sub>1</sub>–R<sub>2</sub>: (400) —, (420) —, (440) 29.3–30.7, (460) 30.4–31.3, (480) 29.6–30.1, (500) 29.8–30.8, (520) 29.7–30.8, (540) 28.4–29.9, (560) 27.9–29.8, (580) 27.9–30.3, (600) 28.4–30.3, (620) 29.2–32.1, (640) 29.7–33.0, (660) 30.6–33.7, (680) 30.7–34.5, (700) 31.7–35.9

**Cell Data:** *Space Group:*  $I\bar{4}md$ ,  $I\bar{4}2m$ ,  $I4mm$ ,  $I422$ , or  $I4/mmm$ .  $a = 3.882(5)$   
 $c = 13.25(2)$   $Z = 1$

**X-ray Powder Pattern:** Majak mine, Russia.

2.91 (100), 2.53 (100), 3.73 (80), 1.941 (50), 1.717 (50), 3.31 (40), 2.18 (40)

| Chemistry: | (1)  | (2)   | (3)   |       | (1)   | (2)   | (3)    |
|------------|------|-------|-------|-------|-------|-------|--------|
| K          |      | 2.30  | 0.02  | Ag    |       |       | 0.02   |
| Tl         | 52.2 | 42.34 | 51.07 | Sb    |       | 0.23  | 0.03   |
| Cu         | 22.6 | 26.55 | 24.91 | As    |       | 0.54  |        |
| Fe         | 9.1  | 7.43  | 7.59  | S     | 16.3  | 18.17 | 16.74  |
|            |      |       |       | Total | 100.2 | 97.97 | 100.38 |

(1) Majak mine, Russia; by electron microprobe, corresponding to Tl<sub>2.01</sub>Cu<sub>2.79</sub>Fe<sub>1.28</sub>S<sub>4.00</sub>.

(2) Murun massif, Russia; by electron microprobe, corresponding to (Tl<sub>0.94</sub>K<sub>0.42</sub>)<sub>Σ=1.36</sub>Cu<sub>3.00</sub>Fe<sub>0.94</sub>S<sub>4.00</sub>. (3) Ílímaussaq intrusion, Greenland; by electron microprobe, original total given as 100.37%; corresponding to Tl<sub>1.91</sub>Cu<sub>3.01</sub>Fe<sub>1.04</sub>S<sub>4.00</sub>.

**Occurrence:** In base-metal sulfide deposits and hyperalkalic massifs.

**Association:** Platinum and palladium minerals, altaite, galena, sphalerite, djerfisherite, pentlandite, cubanite, chalcopyrite (Majak mine, Russia); chalcopyrite, chalcocite, bornite, idaite (Murun massif, Russia); gudmundite, cuprostibite, djerfisherite, galena, troilite (Ílímaussaq intrusion, Greenland).

**Distribution:** In Russia, from the Majak mine, Talnakh area, Noril'sk region, western Siberia [TL]; and at the Murun massif, southwest of Olekminsk, Sakha. From Kangerdluarsuk Fjord and at Nakkaalaaq Mountain, southern Greenland. In the Rajpura-Dariba polymetallic deposit, Rajasthan, India. From Mont Saint-Hilaire, Quebec, Canada.

**Name:** For the constituents THAllium; CUprum, *copper*; and Sulfur.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 77165.

**References:** (1) Kovalenker, V.A., I.P. Laputina, T.L. Evstigneeva, and V.M. Izoitko (1976) Thalcusite, Cu<sub>3-x</sub>Tl<sub>2</sub>Fe<sub>1+x</sub>S<sub>4</sub>, a new thallium sulfide from copper-nickel ores of the Talnakh deposits. Zap. Vses. Mineral. Obshch., 105, 202–206 (in Russian). (2) (1977) Amer. Mineral., 62, 396 (abs. ref. 1). (3) Dobrovol'skaya, M.G., V.S. Malov, V.P. Rogova, and L.N. Vyal'sov (1982) New occurrence of potassium-containing thalcusite in charoite rocks of the Murun massif. Doklady Acad. Nauk SSSR, 267, 1214–1217 (in Russian). (4) Mackovicky, E., Z. Johan, and S. Karup-Møller (1980) New data on bukovite, thalcusite, chalcothallite and rohaite. Neues Jahrb. Mineral., Abh., 138, 122–146.

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