## Murunskite $K_2(Cu, Fe)_4S_4$

**Crystal Data**: Tetragonal. *Point Group*: 4/*m* 2/*m* 2/*m*. As very tiny grains, to 1 $\mu$m, and in aggregates.

**Physical Properties**: *Cleavage*: Imperfect. *Tenacity*: Brittle. Hardness = Soft.
VHN = 92-123, 109 average (10 g load). D(meas.) = n.d. D(calc.) = [3.86]

**Optical Properties**: Opaque. *Color*: Copper-red to pinchbeck-brown, iridescent; grayish orange-cream in reflected light; a fresh surface oxidizes to a sooty black film. *Luster*: Metallic.
*Anisotropism*: Moderate, gray to brownish gray with a bluish tint.
R: (400) — , (420) — , (440) 15.0, (460) 15.6, (480) 16.6, (500) 17.4, (520) 18.2, (540) 19.2, (560) 20.0, (580) 21.0, (600) 21.8, (620) 22.6, (640) 23.3, (660) 24.0, (680) 24.6, (700) 25.4

**Cell Data**: Space Group: *I*4/*mmm*. $a$ = 3.8460(10) $c$ = 13.308(3) Z = 1

**X-ray Powder Pattern**: Murun massif, Russia.
6.52 (10), 2.53 (8), 2.90 (6), 1.940 (5), 1.715 (4), 2.10 (3), 3.29 (2)

**Chemistry**:

| | (1) | (2) |
|---|---|---|
| K | 14.57 | 17.27 |
| Cu | 44.38 | 42.09 |
| Fe | 12.07 | 12.33 |
| S | 28.14 | 28.31 |
| Total | 99.16 | 100.00 |

(1) Murun massif, Russia; by electron microprobe, corresponding to $K_{1.72}Cu_{3.23}Fe_{1.09}S_{4.05}$.
(2) $K_2Cu_3FeS_4$.

**Polymorphism & Series**: Forms a series with thalcusite.

**Occurrence**: In rocks that have undergone intensive potassium metasomatism.

**Association**: Charoite, acmite, potassium feldspar.

**Distribution**: From the Murun alkalic massif, near Olekminsk, Sakha and Mt. Koashva, Khibiny massif, Kola Peninsula, Russia.

**Name**: For the locality in the *Murun* massif, Russia.

**Type Material**: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (81604).

**References**: (1) Dobrovolskaya, M.G., A.I. Tsepin, T.L. Evstigneeva, L.N. Vyal'sov, and A.O. Zaozerina (1981) Murunskite, $K_2Cu_3FeS_4$, a new sulfide of potassium, copper, and iron. Zap. Vses. Mineral. Obshch., 110, 468-473 (in Russian). (2) (1982) Amer. Mineral., 67, 624 (abs. ref. 1). (3) Pekov, I.V., N.V. Zubkova, D.V. Lisitsyn, and D.Y. Pushcharovsky (2009) Crystal structure of murunskite. Dokl. Akad. Nauk, 424, 385-387 (in Russian), Dokl. Earth Sci., 424, 139-141 (in English). (4) (2010) Amer. Mineral., 95(10), 1600 (abs. ref. 3).