

**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m, 3m$ , or  $32$ . Massive and as stellate aggregates.

**Physical Properties:** *Cleavage:* {0001}. Hardness = n.d. VHN = 93–98 (15 g load). D(meas.) = n.d. D(calc.) = 4.89

**Optical Properties:** Opaque. *Color:* Blue; blue with a slight violet tint in oil under reflected light. *Streak:* n.d. *Luster:* Metallic. *Pleochroism:* Blue to bluish white. *Anisotropism:* Strong, orange-red.

R<sub>1</sub>–R<sub>2</sub>: (400) 19.2–32.9, (420) 18.6–32.3, (440) 17.9–31.4, (460) 16.9–30.5, (480) 15.6–29.5, (500) 14.2–28.2, (520) 12.4–27.0, (540) 10.7–25.6, (560) 9.08–24.3, (580) 7.51–23.1, (600) 6.15–22.2, (620) 5.02–22.2, (640) 4.33–23.0, (660) 4.38–23.6, (680) 5.96–23.4, (700) 9.44–23.0

**Cell Data:** *Space Group:*  $P\bar{3}m1, P3m1, P31m$ , or  $P321$ .  $a = 3.800(1)$   $c = 67.26(4)$   
Z = 3

**X-ray Powder Pattern:** Spionkop Creek, Canada.  
1.899 (100), 3.061 (55), 2.767 (35), 5.032 (30), 3.678 (25), 2.849 (25), 5.955 (20)

| <b>Chemistry:</b> | (1)  | (2)   | (3)    |
|-------------------|------|-------|--------|
| Cu                | 68.5 | 68.5  | 69.03  |
| Fe                |      | 0.1   |        |
| Ag                |      | 0.2   |        |
| S                 | 30.4 | 31.5  | 30.97  |
| Total             | 98.9 | 100.3 | 100.00 |

(1) Yarrow and Spionkop Creeks, Canada; by electron microprobe. (2) Cannington Park, England; by electron microprobe. (3) Cu<sub>9</sub>S<sub>8</sub>.

**Occurrence:** As weathering-produced lamellar replacements of other copper sulfides in stratabound red-bed copper deposits (Yarrow and Spionkop Creeks, Canada).

**Association:** Anilite, djurleite, spionkopite, tennantite (Yarrow and Spionkop Creeks, Canada).

**Distribution:** In the Upper Grinnell Formation, Spionkop Creek and Yarrow Creek areas of southwestern Alberta, Canada. In the High Rolls district, Otero Co., New Mexico, and at Washington Pass, Okanogan Co., Washington, USA. From Cannington Park, Bridgwater, Somerset, England. In the Lubin and Rudna copper mines, near Legnica, Zechstein copper district, Lower Silesia, Poland.

**Name:** For the type locality at Yarrow Creek, Canada.

**Type Material:** Canadian Geological Survey, Ottawa; Queen's University, Kingston, Ontario, Canada; National Museum of Natural History, Washington, D.C., 149430, 149431; Harvard University, Cambridge, Massachusetts, USA, 122290.

**References:** (1) Goble, R.J. (1980) Copper sulfides from Alberta: yarrowite, Cu<sub>9</sub>S<sub>8</sub>, and spionkopite, Cu<sub>39</sub>S<sub>28</sub>. Can. Mineral., 18, 511–518. (2) (1981) Amer. Mineral., 66, 1279 (abs. ref. 1).