

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals short to long prismatic || [001], with {110} and {100} well developed, terminated by steep pyramidal forms, to 10 cm; less commonly pyramidal. In radially fibrous botryoidal crusts and concretionary masses; coarse to fine granular, massive. *Twining:* Very common on {011}, as contact and penetration twins, geniculated; lamellar.

Physical Properties: *Cleavage:* {100} imperfect, {110} indistinct; partings on {111} or {011}. *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle. Hardness = 6–7 VHN = 1239–1467 (200 g load). D(meas.) = 6.98–7.01 D(calc.) = 6.993

Optical Properties: Transparent when light colored, dark material nearly opaque; commonly zoned. *Color:* Black, brownish black, reddish brown, red, yellow, gray, white; rarely colorless; in transmitted light, colorless to brown, orange, yellow, green; in reflected light, light gray with white to brownish internal reflections. *Streak:* White, pale brown, pale gray. *Luster:* Adamantine to adamantine metallic, splendent; may be greasy on fractures.

Optical Class: Uniaxial (+); anomalously biaxial. *Pleochroism:* Strong to very weak; yellow, red, brown. *Absorption:* $E > O$. $\omega = 1.990\text{--}2.010$ $\epsilon = 2.093\text{--}2.100$ $2V(\text{meas.}) = 0^\circ\text{--}38^\circ$

Anisotropism: Strong.

$R_1\text{--}R_2$: (400) 11.7–13.2, (420) 11.6–13.0, (440) 11.5–12.8, (460) 11.4–12.6, (480) 11.3–12.5, (500) 11.2–12.4, (520) 11.0–12.2, (540) 11.0–12.1, (560) 10.9–12.0, (580) 10.9–12.0, (600) 10.8–12.0, (620) 10.8–12.0, (640) 10.7–12.0, (660) 10.7–12.0, (680) 10.6–12.0, (700) 10.6–12.0

Cell Data: *Space Group:* $P4_2/mnm$ (synthetic). $a = 4.7382(4)$ $c = 3.1871(1)$ $Z = 2$

X-ray Powder Pattern: Synthetic.

3.347 (100), 2.6427 (75), 1.7641 (57), 2.3690 (21), 1.6750 (14), 1.4155 (14), 1.4392 (12)

Chemistry:

	(1)		(1)
SiO ₂	0.18	rem.	0.22
SnO ₂	99.26	Total	99.66

(1) St. Michael's Mount, Cornwall, England; by electron microprobe, remnant is FeO 0.11%, In₂O₃ 0.04%, Nb₂O₅ 0.03%, WO₃, TiO₂, IrO₂, Ta₂O₅ each 0.01%.

Mineral Group: Rutile group.

Occurrence: In medium- to high-temperature hydrothermal veins and greisen, in granite, granite pegmatite, rhyolite; rarely in contact metamorphic deposits; in large alluvial placers.

Association: Quartz, muscovite, wolframite, tourmaline, topaz, fluorite, scheelite, lepidolite, arsenopyrite, bismuth, molybdenite.

Distribution: The principal ore of tin; deposits are widespread. Some important localities are: in Germany, in Saxony, at Marienberg, Altenberg, Johannegeorgenstadt, and many other places. At Cínovec (Zinnwald) and Horní Slavkov (Schlaggenwald), Czech Republic. From La Villeder, Morbihan, France. At Panasqueira and Cabreiros, Portugal. In England, at many mines in Cornwall, from St. Just and Carn Brae to Liskeard. From the Jos district, Nigeria. Fine crystals from Otjimbojo, Namibia. Economically important placers on the islands of Banka and Billiton, Indonesia; also in Perak and Selangor States, Malaysia. In Australia, from the New England Ranges, as at Emmaville and Elsmore, New South Wales, and from Greenbushes and Pilbara, Western Australia. At Mt. Bischoff and Mt. Zeehan, Tasmania. In China, from the Xue Bao Diang Mountains, Sichuan Province. Large crystals from Fazenda do Funil, Ferros, Minas Gerais, Brazil. Fine crystals from Bolivia, at Araca, Oruro, Potosí, Huanini, and Llallagua.

Name: From the Greek for *tin*.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 574–581. (2) Deer, W.A., R.A. Howie, and J. Zussman (1962) Rock-forming minerals, v. 5, non-silicates, 5–10. (3) Moore, F. and R.A. Howie (1979) Geochemistry of some Cornubian cassiterites. Mineralium Deposita, 14, 103–107. (4) McCarthy, G.J. and J.M. Welton (1989) X-ray diffraction data for SnO₂. Powder Diffraction, 4(3), 156–159.

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