Ferroselite $FeSe_2$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As slender prismatic crystals, to 1 mm, striated on {110} parallel to [001], with rhombic cross sections; fine-grained massive. *Twinning:* As stellate and cruciform twins; twin lamellae noted in polished section.

Physical Properties: *Tenacity:* Very brittle. Hardness = 6–6.5 VHN = 858–933, 897 average (25 g load). D(meas.) = 7.20 D(calc.) = 7.139 Becomes magnetic on heating.

Optical Properties: Opaque. *Color:* Steel-gray to tin-white with a rose tint, also brass-yellow, tarnishes to a brassy tone; in polished section, white with a gray-brown hue. *Streak:* Black. *Luster:* Metallic. *Pleochroism:* Distinct. *Anisotropism:* Strong, from greenish gray to lilac-gray. R_1–R_2: (400) 42.3–44.1, (420) 42.5–44.3, (440) 43.0–44.5, (460) 43.5–45.1, (480) 43.9–45.9, (500) 44.4–47.0, (520) 44.9–48.2, (540) 45.3–49.5, (560) 46.0–50.9, (580) 46.8–52.3, (600) 47.6–53.7, (620) 48.2–54.9, (640) 48.7–55.9, (660) 49.1–56.3, (680) 49.3–56.5, (700) 49.5–56.7

Cell Data: *Space Group: Pnnm.* $a = 4.8007$ $b = 5.776$ $c = 3.5850$ $Z = 2$

X-ray Powder Pattern: Powder River basin, Wyoming, USA (nearly identical to rammelsbergite).
2.568 (100), 2.474 (100), 1.885 (70), 2.871 (50), 1.695 (40), 2.400 (35), 1.541 (35)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
Fe	27.87	26.4	26.13	Cu		0.2	
Co		0.1		Se	72.13	74.0	73.87
				Total	[100.00]	100.7	100.00

(1) Ust'-Uyuk V–Se–U deposit, Russia; recalculated to 100% after deduction of 4% insoluble; corresponds to $Fe_{1.09}Se_{2.00}$. (2) Trogtal quarry, Germany; by electron microprobe, corresponds to $(Fe_{1.01}Cu_{0.01})_{\Sigma=1.02}Se_{2.00}$. (3) $FeSe_2$.

Polymorphism & Series: Dimorphous with dzharkenite.

Mineral Group: Marcasite group.

Occurrence: In red-bed deposits of the Colorado Plateau type, peripheral to pyrite and uranium concentrations (Utah, USA); in U–V ores in sandstone, with coalified wood (Colorado, USA); with other sulfides and selenides cementing sandstones and pelites (Tuva, Russia).

Association: Uraninite, pyrite, marcasite, chalcopyrite, sphalerite, selenium, clausthalite, cadmoselite, bornite, cobaltomenite, laumontite, barite.

Distribution: In Russia, from the Ust'-Uyuk V–Se–U deposit, Tuva, Siberia [TL]; and in the Zapadno-Ozernogo Cu–Zn deposit, Southern Ural Mountains. From the Seluchekinskoye deposit, Kazakhstan. In Finland, at Kuusamo. In the Czech Republic, at the Petrovice uranium deposit, near Ždăr, and the Předbořice uranium deposit, near Krásna Hora. In the Trogtal quarry, near Lautenthal, Harz Mountains, Germany. In the USA, at several localities in Utah, on the Colorado Plateau, including the A.E.C. no. 8 mine, Temple Mountain, Emery Co. and the Repete mine, San Juan Co.; in Wyoming, from sandstones of the Powder River basin; from the Kermac Sec. 10 mine, McKinley Co., New Mexico; in the Mitten #2 mine, Navajo Co., Arizona; and from a number of mines in the Uravan district, Montrose Co., Colorado. At Tuminico, Sierra de Cacho, La Rioja Province, Argentina.

Name: For iron, FERrum, and SELenium in the composition.

Type Material: Mining Museum, St. Petersburg Mining Institute, St. Petersburg, 46-2/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 69853.

References: (1) Bur'yanova, E.Z. and A.I. Komkov (1955) A new mineral – ferroselite. Doklady Acad. Nauk SSSR, 105, 812–813 (in Russian). (2) (1956) Amer. Mineral., 41, 671 (abs. ref. 1). (3) Granger, H.C. (1966) Ferroselite in a roll-type uranium deposit, Powder River basin, Wyoming. U.S. Geol. Sur. Prof. Paper 550-C, C133–C137. (4) Kjekshus, A. etal (1974) ??title?? Acta Chem. Scand., 28, 996–?? (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 167.