## Sussexite $Mn^{2+}BO_2(OH)$



**Crystal Data:** Monoclinic. *Point Group:* $2/m$. As bladed acicular crystals, to 7 mm; cross-vein or radial fibrous, in felted or matted aggregates, nodular. *Twinning:* Submicroscopic twinning on {100} which cannot be resolved optically.

**Physical Properties:** *Tenacity:* Inflexible. Hardness = 3–3.5 D(meas.) = 3.30 D(calc.) = 3.335

**Optical Properties:** Semitransparent. *Color:* White to buff, straw-yellow, pale pink; colorless in transmitted light. *Streak:* White. *Luster:* Silky, dull, earthy.
*Optical Class:* Biaxial (–). *Orientation:* Parallel extinction; $X$ = elongation; $Z \perp$ flattening. *Dispersion:* $r > v$. $\alpha = 1.670$ $\beta = 1.728$ $\gamma = 1.732$ 2V(meas.) = ∼25°

**Cell Data:** *Space Group:* $P2_1/a$. $a = 12.866(3)$ $b = 10.718(2)$ $c = 3.287(1)$ $\beta = 94.75(3)°$ Z = 8

**X-ray Powder Pattern:** N'chwaning II mine, South Africa.
6.43 (10), 2.773 (7), 3.34 (6), 2.632 (6), 2.494 (6), 2.741 (5), 2.694 (5)

**Chemistry:**

| | (1) | (3) |
|---|---|---|
| $B_2O_3$ | 30.52 | 30.33 |
| FeO | 0.16 | |
| MnO | 49.40 | 61.82 |
| MgO | 9.56 | |
| CaO | 2.03 | |
| $H_2O$ | 8.33 | 7.85 |
| Total | [100.00] | 100.00 |

(1) Franklin, New Jersey, USA; recalculated to 100% after deduction of willemite 4.5%.
(2) N'chwaning II mine, South Africa; by electron microprobe, analysis not given; stated to correspond to $(Mn_{0.95}Mg_{0.05})_{\Sigma=1.00}BO_2(OH)$. (3) $MnBO_2(OH)$.

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

**Occurrence:** A rare hydrothermal mineral typically in veinlets in boron-bearing metamorphosed Mn–Fe–Zn deposits.

**Association:** Pyrochroite, rhodochrosite, wiserite, hausmannite, sonolite, alabandite, seamanite, tephroite, alleghanyite, willemite, leucophoenicite, hauckite.

**Distribution:** In the USA, from Franklin and Sterling Hill, Ogdensburg, Sussex Co., New Jersey; at the Chicagon and Bengal mines, Iron Co., Michigan; in the Mountain Lake mine, Big Cottonwood district, Salt Lake Co., Utah. Large crystals from the N'chwaning II and Hotazel mines, near Kuruman, Cape Province, South Africa. At the Gonzen iron–manganese mine, near Sargans, St. Gallen Canton, Switzerland. In the Kurihara mine, Mie Prefecture, the Yaei mine, Shiga Prefecture, the Hokkoji mine, Tochigi Prefecture, the Matsuo mine, Kochi Prefecture, and a number of other localities in Japan.

**Name:** For Sussex Co., New Jersey, USA, within which the first specimens were collected.

**Type Material:** Yale University, New Haven, Connecticut, 3.1072; National Museum of Natural History, Washington, D.C., USA, 124356.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 375–377. (2) Hoffmann, C. and T. Armbruster (1995) Crystal structure of a (001) twinned sussexite $Mn_2B_2O_4(OH)_2$ from the Kalahari manganese field South Africa. Schweiz. Mineral. Petrog. Mitt., 75, 123–133.