Downeyite SeO_2

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. As acute needlelike crystals, up to 2 cm in length, elongated along [001]; also as radiating sprays. *Twinning:* Contact twinning reported.

Physical Properties: Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.165 Extremely hygroscopic; readily soluble in cold H_2O.

Optical Properties: Transparent. *Color:* Colorless; red from inclusions of amorphous selenium or yellowish from sulfur. *Luster:* Adamantine.
Optical Class: Uniaxial (+); determination of indices hindered by reaction with the immersion media. *Orientation:* Extinction parallel. $n = > 1.80$, moderate birefringence.

Cell Data: *Space Group:* $P4_2/mbc$ (synthetic). $a = 8.3622(7)$ $c = 5.0612(5)$ Z = 8

X-ray Powder Pattern: Synthetic.
3.008 (100), 3.742 (60), 4.180 (55), 3.227 (55), 2.531 (25), 1.933 (18), 1.883 (14)

Chemistry: Electron microprobe analyses found only selenium; identity with synthetic SeO_2 established by correspondence of other properties.

Occurrence: As a rare sublimation product of gases escaping through vents in actively burning culm banks in anthracite coal deposits; forms at about 200 °C near the vents.

Association: Selenium, rosickýite, mascagnite.

Distribution: In the USA, from coal waste piles at Glen Lyon, Luzerne Co., Williamstown, Dauphin Co., Forestville, Schuylkill Co., and Burnside, Northumberland Co., Pennsylvania.

Name: For Wayne F. Downey, Jr., of Harrisburg, Pennsylvania, USA, who first collected the mineral.

Type Material: n.d.

References: (1) Finkelman, R.B. and M.E. Mrose (1977) Downeyite, the first verified natural occurrence of SeO_2. Amer. Mineral., 62, 316–320. (2) Ståhl, K., J.P. Legros, and J. Galy (1992)The crystal structure of SeO_2 at 139 and 286 K. Zeits. Krist., 202, 99–107. (3) (1969) NBS Mono. 25, 7, 60.