Stishovite SiO_2

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. As aggregates of submicron-size crystals.

Physical Properties: Hardness = n.d. VHN = 2080 ∥ [001]; 1700 ⊥ [001] (100 g load, synthetic). D(meas.) = 4.35 (synthetic). D(calc.) = 4.29 Resonance at –191.3 ppm by ^{29}Si magic-angle spinning nuclear magnetic resonance spectroscopy.

Optical Properties: Transparent. *Color:* Colorless.
Optical Class: Uniaxial (+). $\omega = 1.799–1.800$ $\epsilon = 1.826–1.845$

Cell Data: *Space Group:* $P4_2/mnm$ (synthetic). $a = 4.1772(7)$ $c = 2.6651(4)$ $Z = 2$

X-ray Powder Pattern: Meteor Crater, Arizona, USA.
2.959 (100), 1.530 (50), 1.981 (35), 1.235 (25), 2.246 (18), 1.478 (18), 1.870 (13)

Chemistry: Qualitative spectrographic analysis of the mineral from Meteor Crater, Arizona, USA indicates essentially pure SiO_2.

Polymorphism & Series: Quartz, tridymite, cristobalite, and coesite are polymorphs.

Mineral Group: Rutile group.

Occurrence: At sites of meteorite impact, formed by shock metamorphism of quartz at temperatures ≥ 1200 °C and pressures ∼100 kbar; then metastable, alters to glass or cristobalite at ≥ 300 °C.

Association: Coesite, quartz, silica glass.

Distribution: From Meteor Crater, Coconino Co., Arizona, and at the Cretaceous-Tertiary boundary, Raton, Colfax Co., New Mexico, USA. In Germany, at the Nördlinger Ries crater, Bavaria. From the Vredefort Ring crater, Orange Free State, South Africa. At the Ternovska crater, Krivoi Rog, Ukraine. From the Lonar Lake crater, Maharashtra, India.

Name: In honor of the Russian crystallographer Sergei Mikhailovich Stishov, who, with S.V. Popova, first synthesized the compound.

Type Material: n.d.

References: (1) Frondel, C. (1962) Dana's system of mineralogy, (7th edition), v. III, silica minerals, 317–318. (2) Sinclair, W. and A.E. Ringwood (1978) Single crystal analysis of the structure of stishovite. Nature, 272, 714–715. (3) McHone, J.F., R.A. Nieman, C.F. Lewis, and A.M. Yates (1989) Stishovite at Cretaceous-Tertiary boundary, Raton, New Mexico. Science, 243, 1182–1184. (4) Ross, N.L., J.-F. Shu, R.M. Hazen, and T. Gasparik (1990) High-pressure crystal chemistry of stishovite. Amer. Mineral., 75, 739–747.