Forsterite Mg_2SiO_4

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. In euhedral or subhedral crystals, typically thick, with striations ‖ elongation, with wedge-shaped terminations, to 17 cm. Commonly granular or compact massive. *Twinning:* On {100}, {011}, {012}.

Physical Properties: *Cleavage:* {010}, {100}, imperfect. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 7 D(meas.) = 3.275 D(calc.) = 3.271

Optical Properties: Transparent to translucent. *Color:* Green, yellowish, lemon-yellow, white, grayish, blue-gray; colorless in thin section. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (+). *Orientation:* $X = b$; $Y = c$; $Z = a$. *Dispersion:* $r > v$. $\alpha = 1.635$ $\beta = 1.651$ $\gamma = 1.670$ 2V(meas.) = 82°

Cell Data: *Space Group: Pbnm* (synthetic). $a = 4.7540$ $b = 10.1971$ $c = 5.9806$ Z = 4

X-ray Powder Pattern: Ojamo, Finland. (ICDD 7-74).
2.458 (100), 3.883 (70), 2.512 (70), 2.768 (60), 5.10 (50), 2.269 (40), 2.250 (30)

Chemistry:

	(1)
SiO_2	41.72
FeO	1.11
MgO	57.83
Total	100.66

(1) Mogok district, Myanmar; corresponds to $(Mg_{2.02}Fe^{2+}_{0.02})_{\Sigma=2.04}Si_{0.98}O_4$.

Polymorphism & Series: Trimorphous with ringwoodite and wadsleyite; forms two series, with fayalite, and with tephroite.

Mineral Group: Olivine group.

Occurrence: In mafic and ultramafic igneous rocks and thermally metamorphosed impure dolomitic limestones.

Association: Enstatite, plagioclase, phlogopite, magnetite, chromite, antigorite, dolomite, brucite, diopside, corundum, amphiboles, calcite, spinel, augite.

Distribution: Localities for near end member material or good crystals include: at Monte Somma and Vesuvius, Campania, Italy. From Ojamo, Lohja, Finland. At Møre og Ramsdel, Norway. Large crystals from the Kovdor massif, Kola Peninsula, and at Zlatoust and Mt. Itkul, Ural Mountains, Russia. In the Eifel district, Germany, at Forstberg. In the USA, in Arizona, on Peridot Mesa, four km southwest of San Carlos, Gila Co., and at Buell Park, Apache Co. In the Mogok district and at Pyaung Gaung, Myanmar (Burma). Exceptional gemmy crystals from Sapat, 24 km northeast of Naran, Northwest Frontier Province, Pakistan. At Kingiti, Mpapwa, Tanzania. Large gem crystals from the Island of Zabargad (Zabirget or St. Johns), in the Red Sea, Egypt.

Name: After Adolarius Jacob Forster (1739–1806), English mineral collector and dealer.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 450–451, 451–456 [chrysolite]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1982) Rock-forming minerals, (2nd edition), v. 1A, orthosilicates, 3–336. (3) Hazen, R.M. (1976) Effects of temperature and pressure on the crystal structure of forsterite. Amer. Mineral., 61, 1280–1293.