Ferrobustamite $Ca(Fe^{2+}, Ca, Mn^{2+})Si_2O_6$

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystalline, massive. *Twinning:* Simple twins on {100}.

Physical Properties: *Cleavage:* {100}, perfect; {110}, {1$\bar{1}$0}, good. Hardness = 6
D(meas.) = 3.09 D(calc.) = [3.09]

Optical Properties: Semitransparent. *Color:* Colorless, pink to brown.
Optical Class: Biaxial. *Orientation:* $X' \wedge c = 44°$ in section perpendicular to the zone of cleavages. $\alpha = 1.640$ β = n.d. $\gamma = 1.653$ 2V(meas.) = 60(3)°

Cell Data: *Space Group:* $A\bar{1}$. $a = 7.862$ $b = 7.253$ $c = 13.967$ $\alpha = 89°44'$ $\beta = 95°28'$ $\gamma = 103°29'$ Z = 6

X-ray Powder Pattern: Kagata or Ofuku mine, Japan. (ICDD 29-336).
3.270 (100), 3.049 (80), 2.278 (65), 3.470 (60), 3.84 (55), 2.696 (30), 7.67 (25)

Chemistry:

	(1)	(2)	(3)
SiO_2	50.00	53.30	49.8
TiO_2	trace		
Al_2O_3			0.0
Fe_2O_3	0.00		
FeO	9.29	10.44	9.0
MnO	1.22	1.58	1.6
MgO	0.00	0.06	0.1
CaO	38.86	34.63	38.9
H_2O	0.00		
insol.	0.45		
Total	99.82	100.01	99.4

(1) Isle of Skye, Scotland; corresponding to $(Ca_{1.65}Fe_{0.31}Mn_{0.04})_{\Sigma=2.00}Si_2O_6$. (2) Do.; by electron microprobe, corresponding to $(Ca_{1.58}Fe_{0.38}Mn_{0.04})_{\Sigma=2.00}Si_2O_6$. (3) Ofuku mine, Japan; by electron microprobe, corresponds to $(Ca_{1.64}Fe_{0.30}Mn_{0.06})_{\Sigma=2.00}Si_2O_6$.

Occurrence: Surrounding chert nodules in a skarn in dolostone (Isle of Skye, Scotland).

Association: Hedenbergite, grossular-andradite (Isle of Skye, Scotland).

Distribution: At Camas Malag, Isle of Skye, Scotland. From Scawt Hill, near Larne, Co. Antrim, Ireland. In the Kagata, Ofuku, and Ohta mines, Yamaguchi Prefecture; in the Kasugayama and Tsuchiarashi deposits, near Iida, Nagano Prefecture; on Kurodaké Peak, near Toyama, Yoyama Prefecture; in the Tsumo mine, Shimane Prefecture; in the Horado mine, Gifu Prefecture; and at a number of other localities in Japan. From the Wessels mine, near Kuruman, Cape Province, South Africa.

Name: For FERROan iron in its composition and its relation to *bustamite*.

Type Material: n.d.

References: (1) Deer, W.A., R.A. Howie, and J. Zussman (1978) Rock-forming minerals, (2nd edition), v. 2A, single-chain silicates, 575–585. (2) Tilley, C.E. (1948) On iron-wollastonites in contact-skarns: an example from Skye. Amer. Mineral., 33, 736–738. (3) Rapoport, P.A. and C.W. Burnham (1973) Ferrobustamite: the crystal structures of two Ca,Fe bustamite-type pyroxenoids. Zeits. Krist., 138, 419–438. (4) Shimazaki, H. and T. Yamanaka (1973) Iron-wollastonite from skarns and its stability relation in the $CaSiO_3 - CaFeSi_2O_6$ join. Geochem. J., 7, 67–79. (5) Yamanaka, T., R. Sadanaga, and Y. Takéuchi (1977) Structural variation in the ferrobustamite solid solution. Amer. Mineral., 62, 1216–1224. (6) Shimazaki, H. and M. Bunno (1978) Subsolidus skarn equilibria in the system $CaSiO_3 - CaMgSi_2O_6 - CaFeSi_2O_6 - CaMnSi_2O_6$. Can. Mineral., 16, 539–545.