

NOTES

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HALAGURITE - THE MISSING MEMBER OF THE Mn-Mg-Fe PYROXENE QUADRILATERAL

Results of recent investigations into natural manganese-bearing pyroxenes have suggested a possible Mn-Mg-Fe-pyroxene quadrilateral. The granulite-facies manganese-bearing iron-formations of Southern Karnataka, India, contain Ca-poor Mn-Fe-Mg orthopyroxenes as lamellae with Ca-rich clinopyroxene. The widths of the orthopyroxene lamellae vary from 3 to 10 μm (Fig.1). According to microprobe studies this orthopyroxene in sample 164D contains from 17.27 to 18.50% MnO and falls into the $\text{FeMnSi}_2\text{O}_6$ field of the predicted quadrilateral. Due to its high magnesium content, from 9.4 to 10.7%, it

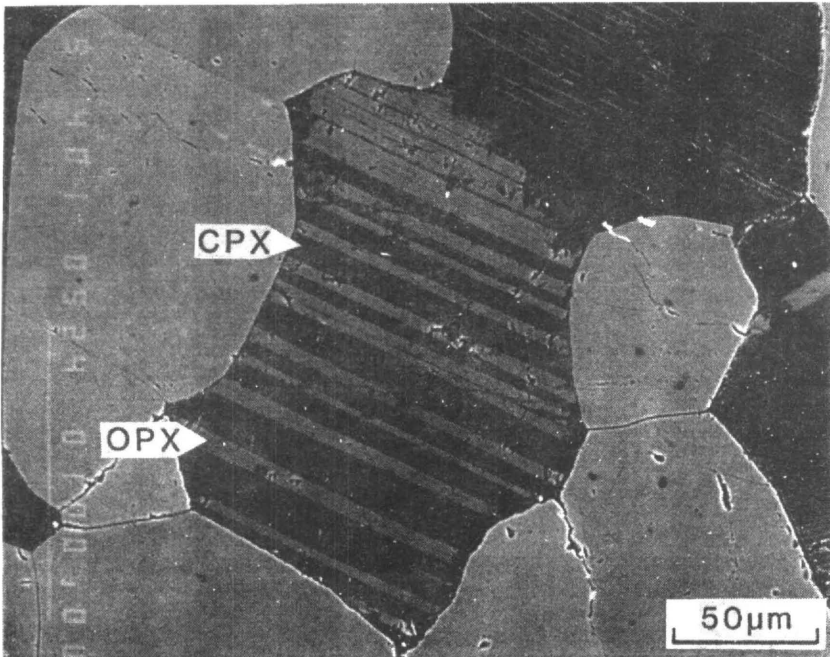


Fig.1. Halagurite - the missing member of the Mn-Mg-Fe pyroxene quadrilateral.

nevertheless occupies the corner opposite the $\text{FeMnSi}_2\text{O}_6$ end-member point. The averaged chemical formula of the grains studied is $\text{Ca}_{0.110}\text{Mn}_{0.624}\text{Fe}_{0.664}\text{Mg}_{0.611}\text{Si}_2\text{O}_6$ (Table I). This new orthopyroxene is tentatively named halagurite.

Transmission electron microscope measurements made by Dr. I. Dodony at Eotvos Lorand University, Hungary, revealed a kanoite-type $P2_1/c$ space group for halagurite. Optical and mineral chemical data on 43 orthopyroxenes from the Halaguru iron-formations prove that there is a continuous solid solution from Mn-free ferrosilite to halagurite (Fig.2) and, consequently that the main Mn-Mg-Fe-pyroxene quadrilateral really exists.

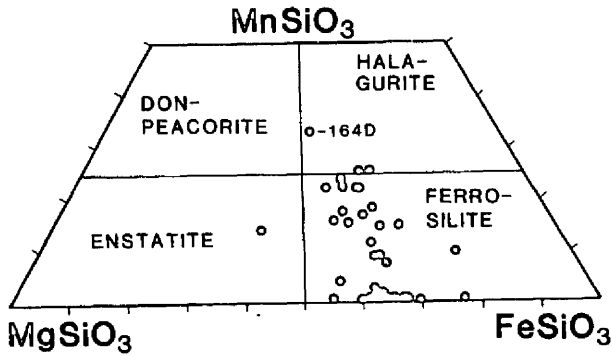


Fig.2. Halagurite in the Mn-Mg-Fe Pyroxene quadrilateral.

Table I. Microprobe analyses of OPX; Sample 164D, Column 7=average of Nos. 1-6

	1	2	3	4	5	6	7
Na ₂ O	0.00	0.04	0.06	0.03	0.05	0.04	0.04
MgO	10.79	9.60	9.66	9.46	9.41	9.37	9.72
Al ₂ O ₃	0.05	0.05	0.05	0.05	0.05	0.05	0.05
SiO ₂	50.46	49.44	50.26	49.80	49.57	49.53	49.86
CaO	1.75	2.40	2.70	2.33	2.34	2.78	2.38
TiO ₂	0.00	0.01	0.02	0.03	0.03	0.05	0.02
V ₂ O ₅	0.01	0.02	0.01	0.02	0.01	0.00	0.01
MnO	17.53	18.40	17.27	17.67	17.42	17.51	17.63
FeO	20.10	19.66	18.42	18.65	18.78	18.42	19.00
ZnO	0.02	0.08	0.03	0.02	0.05	0.02	0.04
Total	100.76	99.69	98.50	97.99	97.73	97.88	98.76
Cations (on the basis of 6 oxygen)							
Si	2.0090	2.0043	2.0366	2.0331	2.0319	2.0302	2.0242
Ti	0.0000	0.0002	0.0006	0.0010	0.0009	0.0016	0.0007
Al	0.0026	0.0022	0.0022	0.0023	0.0022	0.0023	0.0023
Fe	0.6693	0.6667	0.6241	0.6368	0.6439	0.6301	0.6452
Mn	0.5911	0.6318	0.5927	0.6110	0.6049	0.6067	0.6064
Mg	0.6406	0.5801	0.5833	0.5754	0.5752	0.5716	0.5877
Ca	0.0746	0.1042	0.1174	0.1018	0.1028	0.1217	0.1038
Na	0.0000	0.0033	0.0046	0.0027	0.0036	0.0031	0.0029
MnSiO ₃	29.92	31.86	30.91	31.74	31.39	31.43	31.21
FeSiO ₃	33.88	33.62	32.55	33.08	33.42	32.65	33.20
MgSiO ₃	32.43	29.26	30.42	29.89	29.85	29.62	30.25
CaSiO ₃	3.780	5.260	6.120	5.290	5.340	6.310	5.340

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