MINERALOGICAL NOTES

REFLECTIVITY AND MICROINDENTATION HARDNESS OF FERROSELITE FROM COLORADO AND NEW MEXICO[1]

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A sample of uranium ore-bearing sandstone, collected in the Kermac Sec. 10 mine, McKinley County, New Mexico, contains disseminated marcasite on which overgrowths up to 25-μ thick occur. Microchemical tests indicated that the overgrowths are seleniferous and X-ray powder photographs suggested that the overgrowths are ferroselite. Electron microprobe analyses confirmed the identification of the overgrowths as ferroselite. Figure 1 is a set of microprobe images showing the distribution of iron, selenium, and sulfur in the target.

Ferroselite occurs in a number of mines in McKinley County (Granger, 1963) as well as other places on the Colorado Plateau (Coleman, 1959). It occurs as coatings on calcite crystals, as rod-shaped crystals in a clay-like matrix and as stellate clusters disseminated in sandstone (Granger, 1966). The sample from the Kermac Sec. 10 mine represents a new mode of occurrence; ferroselite has not been reported as overgrowths on marcasite.

References concerning the physical properties of ferroselite indicate that no actual measurement of the reflectivity was made. In the original description of the mineral, Bur'yanova and Komkov (1955) gave no data on reflectivity but reported a microhardness of 700 to 720. In Vlasov (1966) the reflectivity is given as about 50 percent and the microindentation hardness is cited as 824 to 861 kg/mm^2. To provide a more precise measure of reflectivity and to add to the data on the variations in hardness, measurements of these properties were made of the ferroselite from New Mexico, as well as from the Virgin No. 3 mine, Montrose County, Colorado (Coleman, 1959).

Reflectivity was measured by means of a Hallimond visual microphotometer fitted with a Schott narrow-band PAL interference filter having maximum transmittance at 546 mμ. A polished section of germanium whose reflectivity had previously been determined by the National Physical Laboratory, Teddington, England, was used as a standard. N.P.L. reflectivities for this standard were 51.4 and 51.2 percent at 540 and 550 mμ, respectively. An interpolated value of 51.3 percent at 546 mμ was used for the measurements.

The reflectivity of the ferroselite from Colorado is 50 ± 1.2 percent, that of the New Mexico ferroselite is 47 ± 1.2 percent. The mean value

[1] Publication authorized by the Director, U.S. Geological Survey.

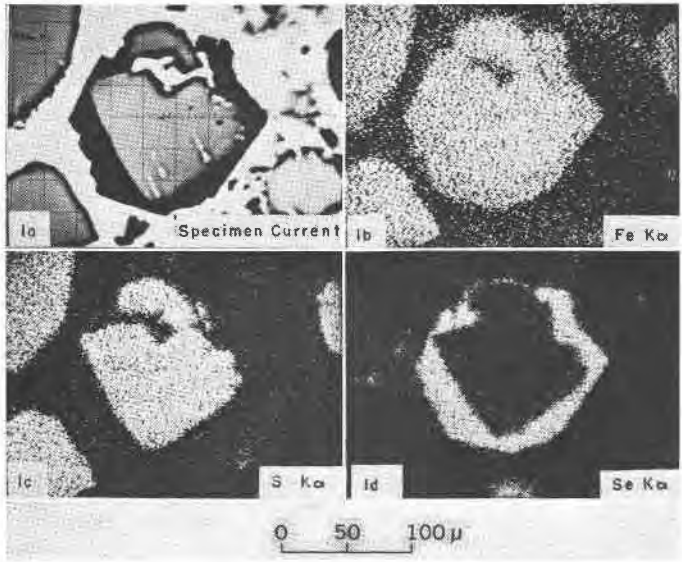

FIG. 1. Specimen current and X-ray scanning images of marcasite with ferroselite overgrowth.

for all measurements is 48 percent. The range in values is probably due to the anisotropism of ferroselite. Extinction positions were difficult to pick with confidence so mean uniradial reflectivity measurements were not attempted.

Apparent minimum and maximum reflectivities of the marcasite in the New Mexico sample are 47.5 and 56.5 percent and the mean reflectivity is 52 percent.

Microindentation hardness (Vickers hardness) of the ferroselite from both places was measured at 25 gram load with a Durimet microhardness tester. HV ranges from 858 to 933. The ranges are similar for both samples and the mean of all determinations is 897.

In reflected light, the color of isolated grains of ferroselite from Colorado is very pale yellow, but against marcasite in the sample from New Mexico, it is pale pink. Reflection pleochroism is conspicuous against marcasite but very faint in isolated grains. The ferroselite in both samples is highly anisotropic.

ACKNOWLEDGMENTS

The author thanks R. H. Heidel, B. F. Leonard, and D. R. Shawe of the U.S. Geological Survey. Mr. Heidel arranged for the electron probe analyses and participated in some phases of the analyses. Mr. Leonard arranged for the use of the germanium standard and supervised some phases of the reflectivity measurements. Mr. Shawe contributed the

ferroselite sample from the Virgin mine. Thanks are also due to John Moscal of the Phillips Electronic Instrument Co. and C. M. Taylor of the Materials Analysis Co., who performed the electron microprobe analyses, and to Professor E. N. Cameron, who kindly lent the germanium standard.

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THE AMERICAN MINERALOGIST, VOL. 53, NOVEMBER–DECEMBER, 1968

NEW DATA ON SARMIENTITE

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Sarmientite, $Fe_2(AsO_4)(SO_4)OH \cdot 5H_2O$, was discovered by V. Angelelli in the locality of La Alcaparrosa, Department Barreal, San Juan province, Argentina, and described by Angelelli and Gordon (1941) who performed the optical and morphological study.

While studying some arsenates and sulfates, a specimen of sarmientite from the original locality was investigated at our laboratory; the present note records the results.

On optical examination the sample appeared to be homogeneous and free of impurities formed by very small crystals up to 20 μm long.

Before the wet analysis was undertaken, a spectrochemical analysis revealed, in addition to the major elements: Ca, Cu (0.1%); Al, Mn (0.01–0.1%) and Si, Mg (0.001%).

The quantitative chemical analysis of the specimen now studied agrees with that given by Angelelli and Gordon (Table 1).

In the electron microscope, crystals showing a habit similar to that described by Angelelli and Gordon are seen (Fig. 1). After long exposure to the electron beam, the crystals alter visibly and crack.

X-Ray Diffraction Data

After a very long search, three crystals permitting single crystal work were found. Rotation, Weissenberg and precession methods were employed to determine the dimensions of the unit cell. These values, slightly modified after data derived from X-ray powder patterns, are