American Mineralogist, Volume 68, pages 742–743, 1983

Reinterpretation of a Verzasca plagioclase: a correction

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Abstract

A single crystal of a metamorphic plagioclase from Verzasca Valley is An_{38} and not An_{63}, as previously reported (Wenk *et al.* 1980). Structural properties including the satellite vector now conform better with those of igneous plagioclase.

E. Wenk *et al.* (1975) described an intergrowth of andesine (An_{34}) and labradorite (An_{63}) from Gordemo, Verzasca Valley, in which the labradorite had *e* satellites with spacing and orientation typical of plutonic andesine. On the basis of X-ray analyses and electron microscopy of metamorphic plagioclase from the Central Alps, H.-R. Wenk (1979) and H.-R. Wenk and Nakajima (1981) concluded that the satellite *e* vector depends both on chemical composition and thermal history and not only on the An content as reported for igneous plagioclase (Smith, 1974, Figs. 5–12). A crystal from the Verzasca locality (Vz 433) was analyzed in some detail. The *e* vector was determined on a single crystal diffractometer and the average structure was refined from X-ray data (H.-R. Wenk *et al.*, 1980). Microprobe analysis on the same crystal but a different fragment than that used in the refinement gave an An content of 63 percent. H.-R. Wenk *et al.* (1980) found that T–O distances for the Verzasca labradorite deviate from those in Figure 4 obtained for other plagioclases near An_{66}. The T–O distances would fit with a low plagioclase of composition near An_{38}. Also cell angles for the Verzasca labradorite (Wenk *et al.*, Table 1) fit with those for a low plagioclase near An_{38}, and the cell lengths are ambiguous. This was very suspicious and called for a reinvestigation.

New electron microprobe analyses of the same crystal fragment used for the X-ray studies show that it is actually an andesine An_{38}. Presumably the earlier microprobe analysis had been made on the labradorite component of the intergrowth. The new analyses were made with a solid-state detector on an ARL-EMX-SM electron microprobe. The crystal was not removed from the fiber used for X-ray mounting, and a carbon coat was applied. It was necessary to burn a hole through a thin coat of glue. The consistency of Si, Al, Ca and Na values suggests that the analysis of An_{38} is correct to $\pm An_5$, and analyses down the length of the crystal were mutually consistent. Greater absorption for Na than for Ca X-radiation may have biased the analysis to a higher An content.

The corrected chemical analysis applies to all structural data for 433 Verzasca in the tables published by H.-R. Wenk *et al.* (1980) and to the *e* vector and lattice parameter data in Table 2 of Wenk (1979). It does not apply to the photomicrograph of the *e*-structure (Fig. 2c) in Wenk *et al.* (1980). As part of this investigation we have redetermined the *e* vector of both andesine and labradorite from an intergrowth with selected area electron diffraction and simultaneous microanalysis within the electron microscope. Results are the following.

$$\text{andesine } An_{35\text{–}40}\text{: T} = 23\text{Å}$$

$$\text{labradorite } An_{70\text{–}75}\text{: T} = 35\text{Å}$$

These values are more similar to those of igneous plagioclase ($An_{65\text{–}70}$: T 42–50Å, Gay 1956). The same is true for structural parameters which are now similar to those of igneous andesine. Until proven otherwise, there is no need to assume that the *e*-vector of metamorphic plagioclase is a simple function of metamorphic grade as stipulated by H.-R. Wenk (1979). However, recombination of *e* APB's in metamorphic plagioclase demonstrates that the *e* superstructure is less regular than in igneous crystals (Wenk and Nakajima, 1981) which corresponds to observations in annealed metal alloys (Van Tendeloo *et al.* 1975).

Acknowledgments

We thank I.M. Steele for making the electron microprobe analyses. JVS acknowledges NSF grant EAR 80-24138, and

HRW NSF grant EAR 77-00127. Dr. H. Kroll has also pointed out the inconsistencies.

References

Gay, P. (1956). The structures of the plagioclase feldspars. VI Natural intermediate plagioclases. Mineralogical Magazine, 31, 21–40.

Smith, J. V. (1974) Feldspar Minerals. Springer, New York.

Van Tendeloo, G., Van Landuyt, H., Delavignette, P., and Amelinckx, S. (1975) Compositional changes associated with periodic antiphase boundaries in the initial stages of ordering in Ni_3Mo, Physica Status Solidi, 25, 697–707.

Wenk, E., Wenk, H.-R., Glauser, A. and Schwander, H. (1975) Intergrowth of andesine and labradorite in marbles of the Central Alps. Contributions to Mineralogy and Petrology, 53, 311–326.

Wenk, H.-R. (1979) Superstructure variation in metamorphic intermediate plagioclase. American Mineralogist, 64, 71–76.

Wenk, H.-R., Joswig, W., Tagai, T., Korekawa, M., and Smith, B. K. (1980) The average structure of An 62–66 labradorite. American Mineralogist, 65, 81–95.

Wenk, H.-R., and Nakajima, Y. (1980) Structure, formation and decomposition of APB's in calcic plagioclase. Physics and Chemistry of Minerals, 6, 169–186.

Manuscript received, July 9, 1982;
accepted for publication, January 17, 1983.