American Mineralogist, Volume 85, pages 858–862, 2000

LETTERS

Incommensurate c-domain superstructures in calcian dolomite from the Latemar buildup, Dolomites, Northern Italy

KATHRYN A. SCHUBEL,[1] DAVID C. ELBERT,[2] AND DAVID R. VEBLEN[2]

[1]Department of Geology and Environmental Geosciences, Lafayette College, Easton, Pennsylvania 18042, U.S.A.
[2]The Morton K. Blaustein Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Maryland 21218, U.S.A.

ABSTRACT

Early exposure cap microdolomites (<50 °C) and low-temperature hydrothermal (<177 °C) calcian dolomite crystals from the Latemar buildup, Dolomites, northern Italy, are microstructurally heterogeneous. Selected-area electron-diffraction patterns contain incommensurate superstructure reflections from domains that are approximately 2.5 nm wide. These domains are quasiperiodic with wavelengths of 5 to 20 nm. The scale of these modulations varies with composition of the bulk crystal.

Previously described c-domain superstructures in dolomite are reported as commensurate with the host structure; c-diffraction spots are situated exactly halfway between the principal (a and b) reflections. Re-examination of published diffraction patterns reveals that some are actually incommensurate. Individual c-domains are monoclinic and have been interpreted to be more calcium-rich than the host dolomite. Newly recognized c-domains resemble previously described c-domains but are distinct because they are incommensurate with the dolomite host and produce diffraction spots with irrational indices.

In samples from the Latemar buildup, the **c**-axes of the host and modulations are parallel, but the [110] directions are not parallel. Further, the length of $c^*_{\mathrm{dolomite}} \approx c^*_{\mathrm{superstructure}}$, but the lattice spacing of $d_{110}^{\mathrm{superstructure}}$ is more than twice $d_{110}^{\mathrm{dolomite}}$. The superstructure phase is metrically monoclinic and is interpreted to incorporate more calcium than dolomite. Domains are, however, too small to analyze directly. Excess calcium may account for the more than doubling of the domains' *a*–dimension relative to that of dolomite. Inclination of the domain lattice relative to the host lattice may vary as a function of calcium content.