

2111 biopyribole intermediate between pyroxene and amphibole: Artifact or natural product?

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ABSTRACT

The 2111 pyribole chain sequence, where 2 signifies a double (amphibole-like) chain and 1 indicates a single (pyroxene-like) chain, has been reported from geological samples. Such material is commonly associated with slabs that contain multiples of three single chains, which we shall call “ $3n$ single-chain slabs” (where $n = 1, 2, 3, \dots$). We generated 2111 chain sequences and associated $3n$ single-chain slabs by heating natural chesterite crystals at ca. 1000 °C in the laboratory as well as by their prolonged irradiation inside a 200 kV transmission electron microscope. Many of the synthesized 2111 sequences are intergrown with narrow regions containing isolated single- and double-chain material that contains, respectively, $3n$ single chains and n double chains. The single-chain triplets presumably formed as a result of the decomposition of isolated triple-chain slabs that were originally intergrown with the chesterite. The 2111 sequence and the $3n$ single-chain slabs can form, respectively, by decomposition of chesterite and triple-chain material during observation or perhaps during ion milling. Recognizing such artifacts is important when attempting to interpret geological history from the details of biopyribole structures and intergrowths.