

ARIEGILATITE, A NEW MINERAL WITH MODULAR STRUCTURE

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The new mineral ariegilatite $\text{BaCa}_{12}(\text{SiO}_4)_4(\text{PO}_4)_2\text{F}_2\text{O}$ (IMA 2016-100; GALUSKIN et al., 2017) was found in spurrite pyrometamorphic rocks of the Hatrurim Complex in the Negev Desert, near Arad City, Israel, associated with spurrite, calcite, brownmillerite, shulamitite, CO_3 -bearing fluorapatite, brucite, fluormayenite-fluorkyuygenite, periclase, barytocalcite, baryte and another potentially new mineral $\text{Ba}_2\text{Ca}_{18}(\text{SiO}_4)_6(\text{PO}_4)_3(\text{CO}_3)\text{F}_3\text{O}$.

Single-crystal diffraction data was collected from a very small ($\approx 30\mu\text{m}$ long) und highly fractured crystal using synchrotron radiation (X06DA, Swiss Light Source, Paul Scherrer Institute, Villigen, Switzerland). The crystal structure of ariegilatite was refined to $R1 = 2.05\%$ ($R-3m$, $a = 7.1905(4)$, $c = 41.251(3)$ Å, $V = 1847.1(2)$ Å³, $Z = 3$).

Ariegilatite is a (PO_4) -analogue of dargaite $\text{BaCa}_{12}(\text{SiO}_4)_4(\text{SO}_4)_2\text{O}_3$ (GFELLER et al., 2015). Therefore, it belongs to the arctite – nabimusaite group [arctite: $\text{BaCa}_7\text{Na}_5(\text{PO}_4)_6\text{F}_3$ (SOKOLOVA et al., 1984), nabimusaite: $\text{KC}_{12}(\text{SiO}_4)_4(\text{SO}_4)_2\text{O}_2\text{F}$ (GALUSKIN et al., 2015)]. This group is characterized by modular structures containing single $\{[WB_6](\text{TO}_4)_2\}$ or triple $\{[W_3B_{12}](\text{TO}_4)_4\}$ anti-perovskite layers intercalated with single $A(\text{TO}_4)$ layers, where $A = \text{Ba}, \text{K}, \text{Sr}\dots$; $B = \text{Ca}, \text{Na}\dots$; $T = \text{Si}, \text{P}, \text{V}^{5+}, \text{S}^{6+}, \text{Al}\dots$; $W = \text{O}^{2-}, \text{F}^-$.

The structure of ariegilatite can be described as a 1:1 stacking of the two modules $\{\text{Ca}_{12}(\text{SiO}_4)_4\text{F}_2\text{O}\}^{4+}$ and $\{\text{Ba}(\text{PO}_4)_2\}^{4-}$ along (001). The stacking type of nabimusaite (arctite) (3:1 type) is defined by intercalation of three $[\text{Ca}_{12}(\text{SiO}_4)_4\text{O}_2\text{F}]^{3+}$ modules with inserted modules of $[\text{K}(\text{SO}_4)_2]^{3-}$.

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