MS15-P133 - LATE | THERMAL EXPANSION OF ALKALINE-EARTH BORATES

Bubnova, Rimma (Grebenshchikov Institute of Silicate Chemistry, Russian Academy of Sciences, Saint Petersburg, RUS); Yukhno, Valentina (Grebenshchikov Institute of Silicate Chemistry, Russian Academy of Sciences, St. Petersburg, RUS); Krzhizhanovskaya, Maria (Dept. of Crystallography, Institute of Earth Sciences, St. Petersburg State University, St. Petersburg, RUS); Filatov, Stanislav (Dept. of Crystallography, Institute of Earth Sciences, St. Petersburg State University, St. Petersburg, RUS)

Here we present the results of investigation of thermal expansion of Ca-borates ($Ca_3B_2O_6$, $Ca_2B_2O_5$ CaB_2O_4, CaB_4O_7) in comparison to that of Mg-, Sr- and Ba-borates [1–4]. Tendency of decrease in the volume expansion as well as high decrease of the melting points is observed with an increase in the B_2O_3 content in the $MO–B_2O_3$ systems (M = Ca, Sr, Ba) as a result of the degree of polymerization increase. Average value of volume expansion increases gradually from 34 (Ca) to 42 (Ba) $\times 10^{-6}$ K^{-1} due to increase of the M^{2+} size. In the $M_3B_2O_6$ (M = Mg, Ca, Sr) stoichiometry, $Mg_3B_2O_6$ borate expands the weakest ($\alpha_V = 30\times 10^{-6}$ K^{-1}).

High anisotropy of the expansion is observed for $M_3B_2O_6$, $M_2B_2O_5$ (0D) and MB_2O_4 (1D) based on the BO_3 triangles only (M = Ca and Sr): the structure highly expands perpendicular to the BO_3 planes, i. e. along the direction of the weaker bonds in the crystal structure. $M_2B_2O_5$ monoclinic polymorphs expand maximally anisotropically due to shear deformations of monoclinic plane.

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[1] Filatov S.K. *et al.* Struct. Chem. (2016) **27**, 1663.
[2] Bubnova R. *et al.* Crystals (2017) **7**, 93.
[3] Volkov S. *et al.* Acta Cryst. (2017) **B73**, 1056.
[4] Firsova V.A. *et al.* Glass Phys. Chem. (2019) **45**, 305.