Lithium triborate crystal growth in an inhomogeneous heat field

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When growing crystals by axisymmetric methods, the most common approach is to create maximum symmetrical homogeneous heat fields. The symmetry of such fields can be described by the symmetry of a stationary cone ($L_\infty/\infty P$). Isotherms in the horizontal sections of those fields are circles. In contrary to this approach, we are developing one, based on the creation of inhomogeneous thermal fields, both static and dynamic.

A dynamic inhomogeneous thermal field is used for the growth of nonlinear optical crystal of lithium triborate LiB_3O_5 (LBO). The growth is performed with the Kyropoulos solution-melt method with low axial temperature gradient and without mechanic rotation of the crystal. To enhance the natural convection processes in the solution-melt, "hot spots" moving around the growth crucible are created by switching on the corresponding heating elements of the growth furnace [1-3]. Thus such method of influence on the process of crystal growth can be so called the heat field rotation.

Acquired experience shows that changing the symmetry of the heat field (creating inhomogeneous heat fields) provides great opportunities for controlling the processes of heat and mass transfer during crystal growth progress. This is especially important when growing borate crystals due to viscous crystallization media. The poster presentation demonstrates some options that effected the growth of LBO crystals.

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References

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