Ni^{2+} DISTRIBUTION IN $BaLiF_3$ CRYSTALS PREPARED BY ZONE MELTING TECHNIQUE

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Transition-metal ions in $BaLiF_3$ crystals give rise to broad-band emissions that are potentially useful as vibronic laser materials. Spectroscopic studies of this matrix showed that the optimal concentration of Ni^{2+} for laser purpose samples should be up to 1 mole %. Samples with this Ni^{2+} concentrations were obtained by Czochraslki method under reactive atmospheres. Nevertheless, even at these low concentrations it was observed during the growth, the formation of a thin metallic film on the melt surface that disturbed the impurity distribution process in the crystals. To study and optimize the incorporation of Ni^{2+} in $BaLiF_3$ we studied the preparation of these crystals by zone melting technique under reactive atmosphere. The compound $BaLiF_3:Ni^{2+}$ was first synthesized under HF atmosphere with 1, 3 and 5 mole % of nickel. We observed the Ni° formation in synthesized ingots even for processes under HF flow. Thermal analysis measurements showed that oxidation and reduction of Ni occurs simultaneously in the melt process. The distribution coefficient was evaluated as 0.1.

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CRYSTAL GROWTH IN OXIFLUORIDE SYSTEMS.

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It is found out that the well-known thermo-chemical reaction AlF3 + SiO2 ---- Al2O3 + SiF4 is not a classical solid phase one. It is considered so, because the generated gas (silicon tetrafluoride) is not only the end product, but also an active transporting agent common for growth of corrundum as per «solid phase-gas-solid phase» mechanism.
The experiments proved that using this mechanism of crystal growth, changing the initial composition of the charge and thermobarric parameters of the process, one can get a wide range of oxide, oxifluoride and alumosilicate crystal compounds representing mono-mineral disperse mass of different fractional composition, *such as fluorphlogopyte, mullite, spinel, garnet, topaz, baddeleyite* and other minerals.