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PHASE EQUILIBRIA AND CRYSTAL CHEMISTRY OF THE $CsF-LuF_3$ SYSTEM

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Carrying out an exploratory program intended for the research of efficient matrices for use as crystalline host materials for U.V. emission in solid state lasers realization, a recent investigation of the $CsF-LuF_3$ system by differential thermal analysis and X-ray diffraction has been undertaken. This study has allowed us to characterize three compounds with formula Cs_3LuF_6, $CsLu_2F_7$ and $CsLu_3F_{10}$ as well as various metastable homogeneous domains lying in the high temperatures region for concentrations between 75 and 86 moles per cent of LuF_3 approximatively.

The crystal structure of a metastable non stoichiometric phase $Cs_{1-x}Lu_3F_{10-x}$ which represents a new structural type characterized by a three-dimensional framework of corner and edge-shared pentagonal bipyramids surrounding the rare earth has been determined from single crystal X-ray diffraction data. Relationships with other structural types, namely $RbIn_3F_{10}$ [1], β-$RbLu_3F_{10}$ [2], $CsYb_3F_{10}$ [3] and U_3O_8 will be discussed.

As more becomes known about crystal chemical of rare earths with small ionic radii we should be able to predict new structural types arising from intergrowth, the existence of which will be discussed at the light of preliminary results.

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