Langbeinite-type ($\alpha$-$\text{K}_2\text{Mg}_2(\text{SO}_4)_3$) phosphates has been intensively investigated over the last decade. In particular, to continue the search of the relationship with large family of $\{\text{M}_x(\text{PO}_4)_y\}^{\text{z}+}$; anionic framework, which covers NASICON (Na Supersonic Conductor), $\text{Sc}_2\text{WO}_6$, Garnet structure types, is being of great interest. In this work the new synthetic approach is applied for single crystal obtaining, following structure investigation of Langbeinite-type phosphates $\text{K}_x\text{Ln}_y\ldots\text{Nb}_z(\text{PO}_4)_s$, where $\text{Ln}=\text{Sc, Y, In, Ho-Lu}$ is subject of this report. The corresponding compounds were grown in spontaneous crystallization mode from fluxes of melted systems $\text{KPO}_3-\text{K}_4\text{P}_2\text{O}_7-\text{LnF}_3-\text{K}_2\text{NbF}_7$. All synthesized tetragonal-shaped crystals belong to the cubic system (sp. gr. P213). Single crystal structure determination revealed correlation between the composition of target compounds and radii of trivalent metal cations. Analysis of potassium, lanthanide and phosphorus bonding parameters (BVS method) allows consider crucial role of phosphate tetrahedron on total stability of the structure.


**Keywords:** phosphates, X-ray crystal structure analysis, crystal synthesis

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_Growth of large single crystals of high-Tc superconductor using a tilted-Lamp floating zone furnace_

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The intimate connection between superconductivity and magnetism in high-Tc cuprates is believed to be fundamental to the superconducting mechanism. So, extensive neutron-scattering measurements had been carried out on $\text{La}_2-x\text{Sr}_x\text{CuO}_4$. Since $\text{La}_2-x\text{Sr}_x\text{CuO}_4$ has small neutron scattering cross-section, large volume of single crystals were needed for these measurements. Typical single crystals grown by Traveling Solvent floating zone method are 5 mm in diameter and few centimeters in length. To accommodate large volume of single crystal in the neutron beam several single crystals are aligned in the beam. This process also leaves empty spaces in between and hence unused part of neutron beam. To overcome these problems here we have grown $\text{La}_2\text{CuO}_4$ single crystal of diameter about 10mm, almost twice of that grown until now (Fig. 1). A specially modified floating zone furnace, Tilted-Lamp Floating zone furnace, where the ellipsoidal mirrors could be tilted downward up to 30 degrees was used for this experiment. Optimum tilting of the mirror-lamp systems modifies the heating profile of the molten zone in a way that we believe, is favorable for growth of single crystals with larger diameters.

**Keywords:** tilted-lamp floating zone, single crystal $\text{La}_{214}$, high-Tc Superconductor