

Thesis:**Synthesis and properties of lead phosphate glasses doped with lanthanide ions**

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Abstract:

In recent years, the phosphate glasses have been interested to research on materials for optical applications. The greatest advantage of the glass systems based on phosphorus(V) oxide is possibility to accommodate higher concentration of lanthanide ions. In this case the local structure of phosphate glass systems still remain amorphous, in contrast to other glasses. Additionally, phosphate glasses are characterized by interesting physicochemical properties such as high transparency and low refractive index.

Because of their unique spectroscopic properties, phosphate glasses are used as optical fibers and amplifiers, visible or infrared solid state lasers and sensors. The glass systems containing Er^{3+} , Pr^{3+} , Yb^{3+} , Nd^{3+} and Tm^{3+} ions are frequently applied in optical telecommunication due to near-infrared emission. On the other hand, Ln^{3+} -doped phosphate glasses ($\text{Ln} = \text{Eu}, \text{Dy}, \text{Tb}, \text{Sm}$) are attractive for optical applications in visible spectral range.

In doctoral dissertation, structural and spectroscopic studies, which were focused on the lead phosphate glasses containing lanthanide ions were presented and discussed. Glass samples have been prepared using conventional high-temperature melting method. The appropriate amounts of all components were weighed and mixed homogeneously together in a glow box in a protective atmosphere of dried argon due to the high hygroscopic nature of phosphorus(V) oxide. It was indicated that the structure as well as optical properties of studied systems strongly depend on qualitative and quantitative composition, presence of modifiers in glass host and concentration of active dopant.