

## COMPLEX LANTHANIDE OXIDES FROM MOLTEN PHOSPHATE – MOLYBDATE (TUNGSTATE) MEDIA: SYNTHESIS, CRYSTAL STRUCTURE AND PHOTOLUMINESCENCE PROPERTIES

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Lanthanide (Ln) doped phosphates, vanadates, molybdates and tungstates have been the subject of recent investigations as potential materials for luminescent applications.

Investigation of  $M^I_2O-P_2O_5-M^{VI}O_3-Ln_2O_3$  ( $LnF_3$ ) ( $M^I$ -Na, K;  $M^{VI}$ -Mo, W) melted systems was carried out in the following binary sections:  $M^I_2PO_3-M^I_2M^{VI}_2O_7$ ,  $0,5(M^I_4P_2O_7 \times M^I_2PO_3)-M^I_2M^{VI}_2O_7$  та  $M^I_4P_2O_7-M^I_2MoO_4$  containing 5 % mol.  $M^{III}_2O_3$  ( $M^{III}$ - La, Nd -Gd, Dy-Lu) or 7 % mol.  $M^{III}F_3$  ( $M^{III}$ -La-Lu). The detailed analysis of results obtained was performed by FTIR-spectroscopy and single crystal X-Ray diffraction. There was revealed three types of compounds (fig. 1), among them a new group of  $K_2Ln(PO_4)(M^{VI}O_4)$  has attracted our attention to study luminescence properties.

Ln	Compounds grown from initial solutions					
	$M^I_2PO_3-$ $M^I_2M^{VI}_2O_7$	$0,5(K_4P_2O_7 \times KPO_3)-K_2M^{VI}_2O_7$		$0,5(Na_4P_2O_7 \times NaPO_3)-Na_2M^{VI}_2O_7$		$M^I_4P_2O_7-$ $M^I_2M^{VI}_2O_4$
		Mo	W	Mo	W	
<i>La</i>	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <math>K_2Ln(PO_4)(M^{VI}O_4) + LnPO_4</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <math>K_2Ln(PO_4)(M^{VI}O_4)</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <math>Na_2Ln(PO_4)(MoO_4) + LnPO_4</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <math>K_2Ln(PO_4)(MoO_4) + LnPO_4</math> </div> </div>					
<i>Ce</i>						
<i>Pr</i>						
<i>Nd</i>						
<i>Sm</i>						
<i>Eu</i>						
<i>Gd</i>						
<i>Tb</i>						
<i>Dy</i>						
<i>Ho</i>						
<i>Er</i>						
<i>Tm</i>						
<i>Yb</i>						
<i>Lu</i>						

Fig. 1. Phase formation in  $M^I_2O-P_2O_5-M^{VI}O_3-Ln_2O_3$  ( $LnF_3$ ) ( $M^I$ -Na, K;  $M^{VI}$ -Mo, W) melted system.

Isostructural analogue  $K_2Bi(PO_4)(MoO_4)$  doped with  $Eu^{3+}$  has been chosen to investigate the concentration series up to  $K_2Eu(PO_4)(MoO_4)$ . Luminescence spectra measured under 4.2 and 300K have been discussed taking into account structural data.

Obtained results show a perspective of these compounds doped with  $Eu^{3+}$  to be used as effective color and white light-emitting photoluminophores.