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

Terebilenko K.V.1, Nedilko S.G.1, Zatovsky I.V.1, Slobodyanik M.S.1, Baumer.V.N.2
Boyko V.V.1, Scherbatskii V.P.1

1 Kiev National Taras Shevchenko University, Kiev, Ukraine
2 STC “Institute for Single Crystals”, National Academy of Science of Ukraine, Kharkiv, Ukraine
E-mail: tereb@bigmir.net

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

Investigation of \( \text{M}^{I}_2\text{O-} \text{P}_2\text{O}_5 - \text{M}^{VI}_3\text{O}_3 - \text{Ln}_2\text{O}_3 \) (LnF\(_3\)) (M\(^I\)-Na, K; M\(^VI\)-Mo, W) melted systems was carried out in the following binary sections: \( \text{M}^{I}_2\text{PO}_3 - \text{M}^{VI}_3\text{O}_7 \), 0.5(\( \text{M}^{I}_4\text{P}_2\text{O}_7 \times \text{M}^{I}_2\text{PO}_3\)) – \( \text{M}^{I}_2\text{M}^{VI}_2\text{O}_7 \) та \( \text{M}^{I}_4\text{P}_2\text{O}_7 - \text{M}^{II}_2\text{MoO}_4 \) containing 5 % mol. M\(^{III}\)\(_2\)O\(_3\) (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\(_2\)Ln(PO\(_4\))(M\(^VI\)O\(_4\)) has attracted our attention to study luminescence properties.

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<th>Compounds grown from initial solutions</th>
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<td>( \text{M}^{I}_2\text{PO}_3 ) ( \times ) ( \text{M}^{VI}_3\text{O}_3 )</td>
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<td>( \text{N}^{II}_0 \times \text{M}^{III}_2\text{O}_3 )</td>
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Fig. 1. Phase formation in \( \text{M}^{I}_2\text{O-} \text{P}_2\text{O}_5 - \text{M}^{VI}_3\text{O}_3 - \text{Ln}_2\text{O}_3 \) (LnF\(_3\)) (M\(^I\)-Na, K; M\(^VI\)-Mo, W) melted system.

Isostructural analogue K\(_2\)Bi(PO\(_4\))(MoO\(_4\)) doped with Eu\(^{3+}\) has been chosen to investigate the concentration series up to K\(_2\)Eu(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.