

BIOGRAPHY



OKSANA MATSELKO

Institute of Inorganic Chemistry
Slovak Academy of Sciences

Project number
1171/01/02

Project duration
9/2022 - 8/2025

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"SASPRO 2 gives a great opportunity to perform research work in a favourite field in the Slovak Academy of Sciences as well as mobility within the world and new cooperation. Gained experience and new skills obtained during the project implementation will provide, without any doubts, a significant medium-term career development and good background for my future scientific career."

Oksana Matselko has received a PhD degree in Inorganic Chemistry at the Ivan Franko National University of Lviv (Ukraine). The work was devoted to the Pd-containing systems and intermetallic compounds for catalysis and was performed under the joined supervision in the Max Planck Institute for Chemical Physics of Solids (Dresden, Germany). The main research interests are: intermetallic compounds and metal fluorides, interaction of the components in ternary systems with emphasis on phase equilibria, formation of new inorganic compounds, their crystal structures and properties, structure – properties relation, knowledge-based approach for the functional materials development.

PROJECT SUMMARY

Investigation of the ternary phases in the systems M-R-F (where M – Li-Cs, (NH₄); R – Sc, Y, Ln) for the development of new multifunctional materials

Lack of the information as well as not completeness of the data prevent the application of the compounds in the development of different types of materials. The search of new compounds with appropriate optical and operational properties is of great interest in the field of solid state fluorine chemistry. The proposed project is focused on the ternary fluorides in the systems M-R-F (where M – Li-Cs, (NH₄); R – Sc, Y, Ln) with emphasis on the temperature driven solid-solid state phase transformations and photoluminescent properties of compounds with further establishment of the regularities of the structural transformations and changes in properties depending on the M and R content.

The main challenge in such kind of research is that it is hard to predict which compound is capable for such transformations until all experimental data are obtained. To shed more light on this issue synthesis of pure compounds, analysis of their thermodynamic data, solid-solid phase transformations as well as solution of the high temperature crystal structures from the X-ray diffraction data (including synchrotron experiments) and properties measurements are suggested.



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PUBLICATIONS

1. Matselko O. The first ternary phase in the Ga-Sn-Pd system: synthesis, crystal structure, and catalytic properties of $\text{Ga}_{2+x}\text{Sn}_{4-x}\text{Pd}_9$ / O. Matselko, U. Burkhardt, Yu. Prots, R.R. Zimmermann, M. Armbrüster, R. Gladyshevskii, Yu. Grin // *Eur. J. Inorg. Chem.* – 2017. – Vol. 2017 (29). – P. 3542–3550.
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2. Matselko O. Revealing electronic influences in the semi-hydrogenation of acetylene / O. Matselko, R.R. Zimmermann, A. Ormeci, U. Burkhardt, R. Gladyshevskii, Yu. Grin, M. Armbrüster // *J. Phys. Chem., C.* – 2018. – Vol. 122 (38). – P. 21891–21896.
<https://doi.org/10.1021/acs.jpcc.8b05732>
3. Matselko O. Phase relations in the ternary system Ga-Pd-Sn at 500°C / O. Matselko, Yu. Grin, R. Gladyshevskii, U. Burkhardt // *Mater. Character.* – 2019. – Vol. 147. – P. 443–452.
<https://doi.org/10.1016/j.matchar.2018.11.012>
4. Kubíková B. Phase equilibria and volume properties of $(\text{LiF-MgF}_2)\text{eut-LnF}_3$ (Ln = Sm, Gd, Nd) molten systems/ B. Kubíková, J. Mlynáriková, O. Matselko, E. Mikšíková, Z. Netriová, Z. Vasková, M. Boča // *Chem. Met. Alloys.* – 2022. – Vol. 353. – P. 118694.
<https://doi.org/10.1016/j.molliq.2022.118694>
5. Zerdoumi R. Disentangling electronic and geometric effects in electrocatalysis through substitution in isostructural intermetallic compounds / R. Zerdoumi, O. Matselko, L. Rößner, B. Sarkar, Yu. Grin, M. Armbrüster // *J. Am. Chem. Soc.* – 2022. – Vol. 144 (18). – P. 8379–8388.
<https://doi.org/10.1021/jacs.2c03348>

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