

Project name, IRN	AP26195173 Optoelectronic properties of pure and transition and semiconductor metal ions doped double halide perovskites
Completion date	01.07.2025-31.12.2027
Project supervisor	Zhanturina Nurgul Nigmatovna
Report	<p>The project is aimed at obtaining new materials based on double halide perovskites doped with transition and semiconductor metal ions by the method of synthesis, testing their structural properties, and studying their optoelectronic properties. Due to their different composition and ratio of anions and cations, this class of new materials has unique physical properties, such as broadband luminescence, high luminescence intensity, and infrared luminescence. Double halide perovskites are less toxic, more stable, and thermally stable. The obtained samples of double perovskites will be subjected to research - recording excitation spectra, radiation, high-pressure luminescence, luminescence kinetics, and photoconductivity. This is necessary to test the properties of materials with varying degrees of doping and to correct synthesis methods and obtain materials with specified physical properties.</p>
Purpose	To synthesize pure and transition and semiconductor metals ions-doped double halide perovskites with further investigation of their optoelectronic properties and formulation of proposals for their practical use.
Expected results	<p>1. As a result of the project implementation, it is planned to publish at least two (2) articles and/or reviews in peer-reviewed scientific journals within the project's research area that are included in the 1st and 2nd quartiles by impact factor in the Web of Science database, indexed in Science Citation Index Expanded, and/or in the Scopus database with a CiteScore percentile of at least 70.</p> <p>In addition, at least two (2) articles or reviews will be published in peer-reviewed foreign and/or domestic journals recommended by the Committee for Quality Assurance in Science and Higher Education (CQASHE).</p> <p>One of the published articles will be in the multidisciplinary category (for multipurpose or interdisciplinary practical application).</p> <p>2. It is planned to obtain a patent for a utility model from the Kazakhstan Patent Office for the method of producing new materials based on double halide perovskites doped with ions of transition and semiconducting metals.</p> <p>3. Application areas of the expected results: photovoltaic devices, electroluminescent equipment, solar cells, and renewable energy.</p> <p>Target users: research laboratories and higher education institutions.</p> <p>4. The synthesis and investigation of the properties of double perovskites will contribute to improving staff qualifications, developing educational programs, creating new high-tech products (such as solar cells and photodetectors), and attracting investments.</p> <p>The development of new high-efficiency materials for solar panels will lead to a reduction in greenhouse gas emissions.</p> <p>The synthesis of double halide perovskites doped with ions of transition and semiconducting metals will promote the discovery of new materials and their application in electronics and photonics.</p> <p>During the implementation of the project, one PhD student will be trained within the framework of the project's research topic.</p>

Research group	<p>Nurgul Zhanturina Researcher ID: GLL-4537-2022 ORCID ID: 0000-0001-9540-6334 Scopus Author ID: 55588115900</p> <p>Tadeusz Lesniewski (University of Gdańsk) Researcher ID: AEO-2721-2022 ORCID ID: 0000-0003-2451-7760 Scopus Author ID: 57073704100</p> <p>Natalia Górecka (University of Gdańsk) Researcher ID: KHE-6746-2024 ORCID ID: 0000-0001-7026-6179 Scopus Author ID: 57189441577</p> <p>Lyudmila Myasnikova Researcher ID: O-9697-2017 ORCID ID: 0000-0003-3326-7206 Scopus Author ID: 16481268100</p> <p>Zukhra Aimaganbetova Researcher ID: GRA-7799-2022 ORCID ID: 0000-0002-8765-516X Scopus Author ID: 56305678700</p> <p>Daulet Sergeev Researcher ID: O-3783-2017 ORCID ID: 0000-0001-7426-3039 Scopus Author ID: 55237792800</p> <p>Muhammad Salman Kiani ORCID ID: 0000-0003-1474-6308 Scopus Author ID: 57209498178</p> <p>Gulnara Beketova Researcher ID: JUB-8584-2023 ORCID ID: 0000-0002-9213-7586 Scopus Author ID: 57223040160</p>
List of published works	