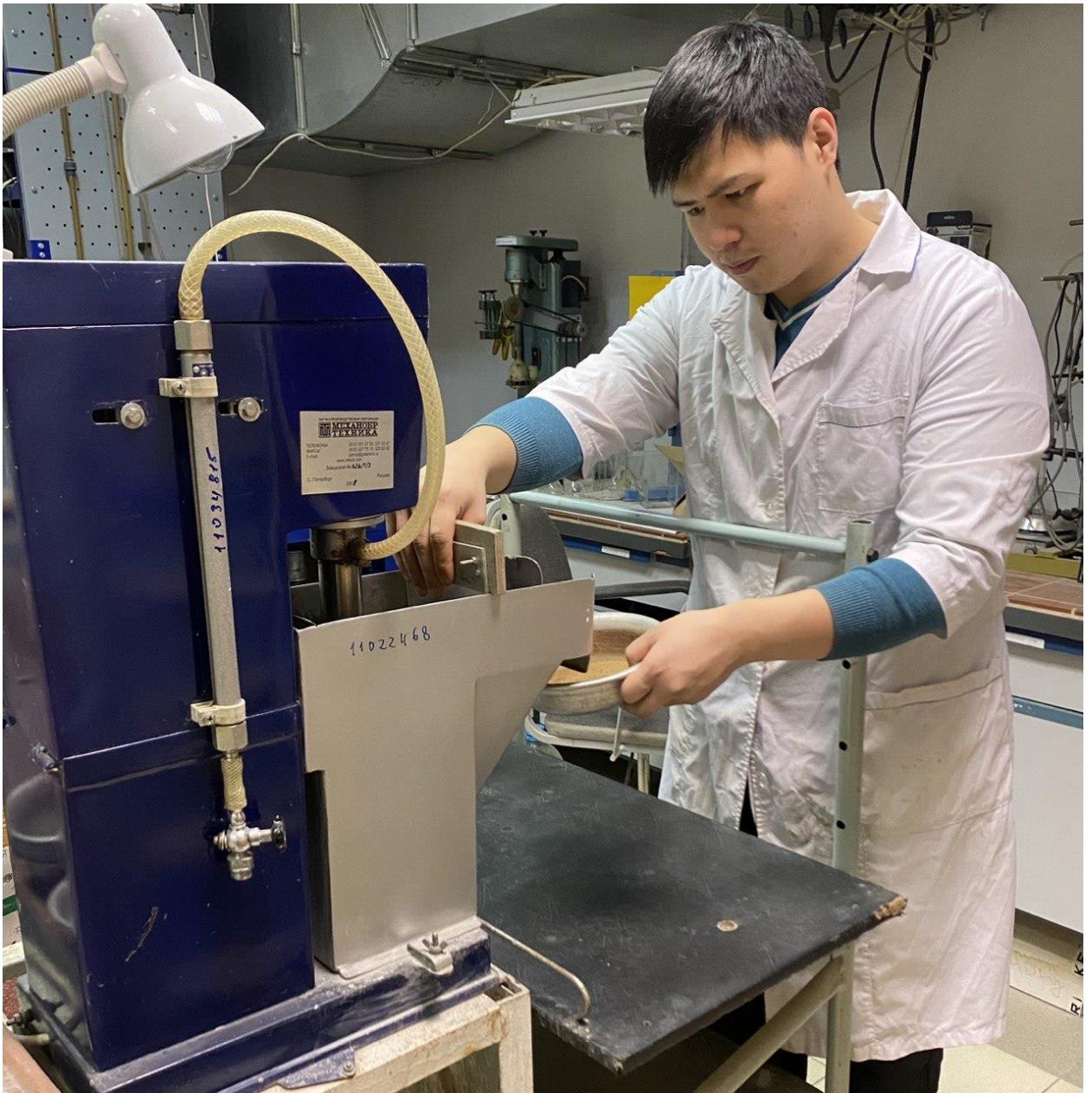


## Brief information about the project

Name of the project	AP19680419 "Scientific justification of the increasing flotation efficiency of lead and zinc industrial minerals from complex carbon-rich polymetallic ore"
Relevance	<p>To date, in connection with the intensive development of world industry and the growing demand for nonferrous metals, the issue of development of difficult to enrich polymetallic ores has become urgent. The necessity in the fastest solution of such problems is caused also by the fact that the quantity of rich and easily enriched deposits of sulfide ores of nonferrous metals has recently sharply decreased, including lead-zinc ores. The problem of enrichment of finely disseminated high-grade polymetallic ores is created. In this connection it is necessary to develop new methods of development of lead-zinc ore deposits. A complex approach to the solution of this problem is required, from modern methods of analysis of material composition of initial raw materials and enrichment products to methods of processing considering combined enrichment technologies. It is important to study the raw materials, the necessary conditions for opening of grains, mineral associations, grain size distribution, complex mineralogical analysis as much as possible.</p>
Purpose	<p>The aim of the project is to develop a scientific basis for the technology of complex processing of hard-to-enrich Pb-Zn ore of Shalkiya deposit with obtaining high-quality lead and zinc concentrates.</p>
Objectives	<p>1) To study the material composition of ore:</p> <ul style="list-style-type: none"> <li>- to specify the chemical composition;</li> <li>- to precise the phase composition of Pb-Zn ore of Shalkiya deposit;</li> <li>- to specify the granulometric composition of ore;</li> <li>- electron-microscopic research using automated mineralogical complex MLA 650 (FEI Company) on the basis of a scanning electron microscope FEI Quanta 650 SEM;</li> <li>- study of crushing and opening kinetics of carbonaceous substances and mineral phases of valuable components;</li> </ul> <p>2) It is planned to carry out:</p> <ul style="list-style-type: none"> <li>- physical modeling of flotation of monomineral outcrops of lead and zinc sulfides; study of flotability of carbonaceous matter;</li> <li>- study of mechanism of interaction of reagents collectors, depressors, regulators of environment on surface properties of carbonaceous substance, galena and sphalerite;</li> <li>- study of physical (temperature, ultrasound, dispersity, coarseness) and physical and chemical effects (flotation agents) on flotation behavior of rock-forming minerals (quartz, dolomite, calcite) to reduce their flotation activity in zinc flotation cycle.</li> </ul> <p>3) Development of the technological scheme of enrichment with the maximum possible indicators of extraction and quality of obtained concentrates of lead and zinc.</p> <p>It is necessary to select enrichment scheme (gravity-flotation or flotation (direct selective or collective-selective scheme)).</p>
Expected and achieved results	<ul style="list-style-type: none"> <li>- full study of the material composition of polymetallic ore of the Shalkiya deposit;</li> </ul>

	<p>- regularities of selective removal of carbonaceous substances to improve the quality of commercial products in the form of lead and zinc concentrates;</p> <p>- the factors influencing the separation of quartz from sphalerite in order to obtain zinc concentrate of ZC0 grade (including methods of reverse cationic flotation, using the method of foam bed irrigation and ultrafine milling for maximum disclosure of sphalerite grains) were established.</p> <p>At least 2 (two) articles and (or) reviews will be published by the end of the project in peer-reviewed scientific publications indexed in the Science Citation Index Expanded and included in the 1st (first) and (or) 2nd (second) quartile by impact factor in the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 65 (sixty-five);</p> <p>- or at least 1 (one) article or review in a peer-reviewed scientific publication indexed in the Science Citation Index Expanded and included in the 1st (first) quartile by impact factor in the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 80 (eighty).</p> <p>The following results were achieved during the 2023 year of the project implementation: sample preparation of initial ore from Shalkiya deposit was carried out. The fractional composition of the crushed representative sample was determined, chemical analysis for the content of valuable components and harmful impurities was carried out, mineralogical composition and mineralogical analysis on anschliffs of briquettes are being studied. The share of each mineral in the ore sample, the beginning of disclosure of valuable components, the distribution of minerals by size classes, the share of concretions were calculated and the forecast estimation of maximum achievable enrichment indicators was given. The results of mineralogical analysis showed that with high probability the ore of Shalkiya deposit is difficult to enrich. This is mainly due to very fine dissemination of valuable mineral particles, a significant amount of concretions and, to a lesser extent, the presence of carbonaceous matter. Gravity fractionation of the initial ore suspension was also carried out and various methods of gravity concentration were tested. The scientific novelty of the present work for the group lies in the emphasis of the research of carbonaceous matter, galena and sphalerite, comparing the results of work on the objects of study, united by a common feature, in comparable experimental conditions. The study of this direction will allow to obtain new knowledge, adaptation of methods to new research tasks will allow to clarify the mechanisms of interaction of sulfhydryl collectors of different ionogenicity with the surface of separated minerals, as well as to compare with the influence of apolar collectors.</p>
<p>Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles</p>	<ul style="list-style-type: none"> <li>• Tokpayev Rustam Rishatovich, PhD, Corresponding Member of KazNANS Hirsch index - 4 (Scopus). Author ID in Scopus - 56998810900 <a href="https://www.scopus.com/authid/detail.uri?authorId=56998810900">https://www.scopus.com/authid/detail.uri?authorId=56998810900</a> Researcher ID Web of Science D-3859-2015 <a href="https://www.webofscience.com/wos/author/record/440647">https://www.webofscience.com/wos/author/record/440647</a> ORCID ID 0000-0002-0117-4454 <a href="https://orcid.org/0000-0002-0117-4454">https://orcid.org/0000-0002-0117-4454</a></li> </ul>

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List of publications with links to them	-
Patents	-



Contractor Ergeshev A.R. receives a flotation concentrate of ore from the Shalkiya deposit

