

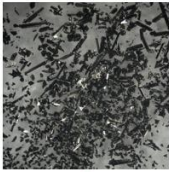

Brief information about the project

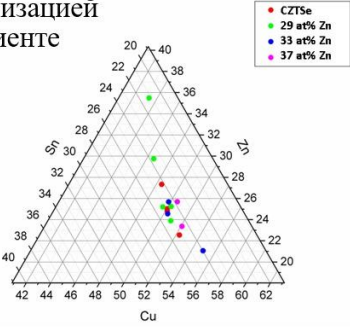
Name of the project	AP19576851 «Synthesis of multi element sulfide standards for LA-ICP-MS analysis»
Relevance	Isotopic and elemental mapping of industrial and natural samples using laser ablation (LA) significantly expands the application of inductively coupled plasma mass spectrometry (ICP-MS), allowing you to clearly visualize spatial relationships and variations at the scale of the laser beam diameter (typically 10-100 μm). A feature of the method is the destruction of the sample and reference standard at the site of analysis, which implies the need for reference samples with a homogeneous distribution of impurities for regular replacement. Considering the importance of sulfides in the accumulation of industrially important trace elements, as well as, for the geochemical interpretation of geological processes, finding ways to reproducibly prepare sulfide standards for LA-ICP-MS remains an important topical task.
Purpose	Development of scientific and methodological bases for obtaining sulfide phases with a homogeneous distribution of impurities on a scale of 10-50 microns for use as an external standard for the LA-ICP-MS method
Objectives	<ol style="list-style-type: none">1. Synthesis of matrices in the (Fe,Cu)-S system, selection of natural samples from ore concentrates, preparation of a sample of microimpurities.2. Mechanical homogenization in a ball mill of the matrix material and sample of microimpurities in concentrations of 20 and 200 ppm.3. Characterization of the phase and chemical composition of the matrix before and after homogenization.4. Pressing and annealing tablets at different temperatures.5. Preparation of polished sections.6. Study of the distribution of microimpurities in prepared samples by LA-ICP-MS.
Expected and achieved results	<ol style="list-style-type: none">1) Samples of experimental sulfide standards (~20 pcs) with microimpurities (25 elements, including noble metals) will be made.2) Experimental information will be obtained on the distribution of microimpurities in samples by the LA-ICP-MS method at various laser beam diameters.3) Recommendations will be formulated on the procedure for the reproducible synthesis of the sulfide standard, ensuring the most uniform distribution of trace impurities.
Research team members with their identifiers (Scopus	Bakhadur Askar ORCID: https://orcid.org/0000-0002-3315-7835

<p>Author ID, Researcher ID, ORCID, if available) and links to relevant profiles</p>	<p>Scopus Author ID: 57140717700 ResearcherID: AAR-1894-2020</p> <p>Bolatov Asset ORCID: https://orcid.org/0000-0002-9677-2114 Scopus Author ID: 56436739800 ResearcherID: B-1258-2015</p> <p>Uralbekov Bolat ORCID: http://orcid.org/0000-0002-3245-4096 Scopus Author ID: 36664090200 ResearcherID: IRW-8210-2023</p> <p>Kenges Kairat ORCID: https://orcid.org/0000-0001-6408-6083 Scopus Author ID: 57197734961 ResearcherID: AAV-5793-2020</p> <p>Zholdas Yerassyl ORCID: https://orcid.org/0000-0002-5405-2389 Scopus Author ID: 57970652700 ResearcherID: HHJ-9854-2022</p>
<p>List of publications with links to them</p>	<p>-</p>
<p>Patents</p>	<p>-</p>

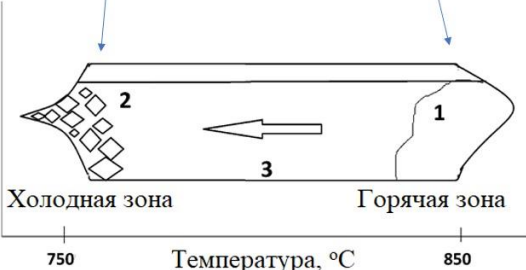
Температура: 750°-850° С
Длительность: 144 часа
Флюс: KI-KCl (0,6 моль KI)
Добавка: ZnSe

Получение монокристаллов $Cu_2ZnSnSe_4$ перекристаллизацией в температурном градиенте



Тройная диаграмма Cu-Zn-Sn, показывающая составы монокристаллов после 144 часов перекристаллизации.



Холодная зона Горячая зона

750 Температура, °С 850

Схема кварцевой ампулы при перекристаллизации в градиенте температуры: 1 - шихта; 2) кристаллы; 3) расплавленный флюс



Ампулы с шихтой и растворителем до проведения перекристаллизации