

CEIPEX BUT TOPIC 7

Položka / Field	Obsah / Content
CEIPEX RESEARCH TOPIC LEVEL 1	Industrial Cybernetics
CEIPEX RESEARCH TOPIC LEVEL 2	Advanced instrumentation and methods for materials characterization
NAME OF THE RESEARCH GROUP	Advanced Instrumentation and Methods for Materials Characterization (RG-1-06)
SUPERVISOR	Prof. Jozef Kaiser
POTENTIAL CO-SUPERVISOR	Dr. Pavel Pořízka
PROPOSED RESEARCH TOPIC TITLE	LIMA: LIBS Integrated Mineral Analyzer for Automated Mineralogy and Quantitative Elemental Prediction
RESEARCH TOPIC DESCRIPTION	The project aims to develop LIMA (LIBS Integrated Mineral Analyzer), a tool for rapid, automated mineralogical and elemental characterization of geological materials. LIMA will combine laser-induced breakdown spectroscopy (LIBS) with data-driven mineral classification and quantitative prediction of elemental composition, providing spatially resolved information suitable for high-throughput mineral analysis. The postdoctoral researcher will link LIBS spectral information with mineralogical and geochemical reference data and establish robust workflows for mineral identification, elemental quantification, and validation on representative geological samples. Key challenges include heterogeneous matrices, spectral interferences, matrix effects, calibration transfer, uncertainty assessment, and integration with complementary mineralogical methods. The work will also address strategies for converting complex spectral maps into interpretable mineralogical and geochemical outputs. The ideal candidate will have a strong background in geology, mineralogy, geochemistry, or a related field, complemented by experience in analytical chemistry and quantitative data interpretation. Experience with spectroscopic techniques, chemometrics, machine learning, multivariate statistics, or automated mineralogy is highly desirable. The project will integrate plasma spectroscopy, analytical chemistry, geology, and data science, with the goal of establishing LIMA as a practical platform for automated mineralogical analysis and reliable prediction of elemental composition.
KEYWORDS	LIBS, automated mineralogy, geochemistry, elemental analysis, mineral identification, chemometrics, machine learning
INTERDISCIPLINARY DIMENSION	The project links plasma spectroscopy and analytical chemistry with geology, mineralogy, geochemistry, and data science, enabling collaboration across CEITEC research areas in advanced characterization and data-driven analysis.
WEBPAGE OF THE RESEARCH GROUP	https://www.ceitec.eu/advanced-instrumentation-and-methods-for-materials-characterization/rg6