

## DEVELOPMENT OF A PHYSICOCHEMICAL ANALYSIS SYSTEM BASED ON LASER INDUCED BREAKDOWN SPECTROSCOPY

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### ABSTRACT

The article presents the development of a physicochemical analysis system based on laser induced breakdown spectroscopy, or LIBS. The developed LIBS system was composed by a portable Nd:YAG+++ with an estimated power of  $10 \text{ MW/cm}^2$ , a diffraction spectrometer of  $0.27 \text{ nm}$  of resolution and  $76.9 \text{ nm}$  of spectral width, a light delivery and gathering system, electronic coordination system and the spectral analysis software that processes the data obtained by the spectrometer, all this elements were developed at the CIO. The light delivery and gathering system focuses the laser radiation to form the plasma, then gathers the emitted light, sending it through an optical fiber to the spectrometer. This last system was based on a laser radiation focusing lens, a light gathering lens coupled to an optical fiber, and the opto-mechanical elements for a precise positioning of the area to be analyzed. The analysis software was based on Matlab, it allowed to perform comparisons with known LIBS spectra, look for coincidences and establish the presence of different elements in the analyzed spectra. The results were satisfactory, accomplishing the identification of Cu and Li in different analyzed samples. Finally, a portable version of the developed system was proposed, showing its capacity to perform field measurements in the mining and geochemistry fields.

**Keywords:** Laser Induced Breakdown Spectroscopy, LIBS, Physicochemical Analysis, Spectral Analysis.