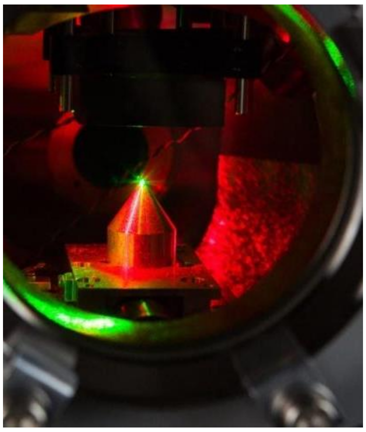
Ceramic Material Contamination Analysis

Challenges

Chemical investigation of ceramic materials presents a **challenge** for conventional analytical tools. Their **insolubility** in most acids has to be considered if we decide to choose *ICP-OES*, thus making the analysis impossible. In the case of *XRF* analysis, **light-weight elements**, which are presented as impurities in ceramic materials, are hard to or even impossible to detect. Analysis with *SEM* takes a significant amount of **time**, the sample has to be made **electrically conductive,** and usually, only a **small piece** of material is analyzed.



Solution

For ***LIBS analysis***, there is no need for any sample preparation. Light-weight elements can be easily detected and quantified while allowing the investigation of larger surfaces or depths of ceramic material. All this within **seconds to minutes**.

The aforementioned reasons and the compelling results strongly indicate that our **Sci-Trace** and **M-Trace** LIBS analyzers are perfectly suited for conducting a comprehensive examination of the chemical composition of ceramics.

Results

Using our Sci-Trace Instrument, we were able to analyze different ceramic materials in the ambient atmosphere, and detect impurities such as boron, lithium, silicate glass gaze, potassium, magnesium and others. Figures 1-3 present a fast and easy way to detect boron contamination with signal-to-noise ratio **S/N 32**, lithium contamination (**S/N 46**), or forming of glass glaze on the surface of the analyzed ceramic material.

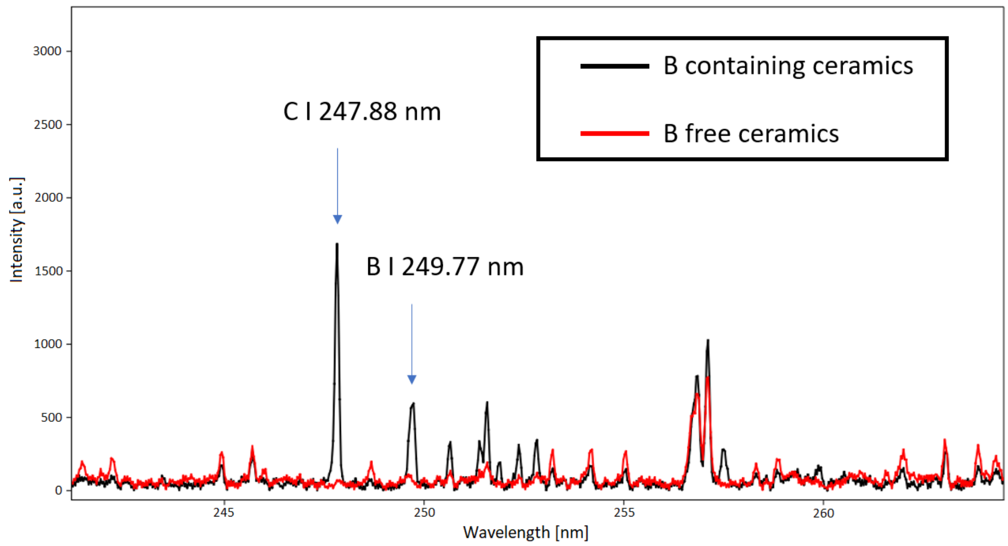


Figure 1: Detection of boron contamination in the ceramic sample

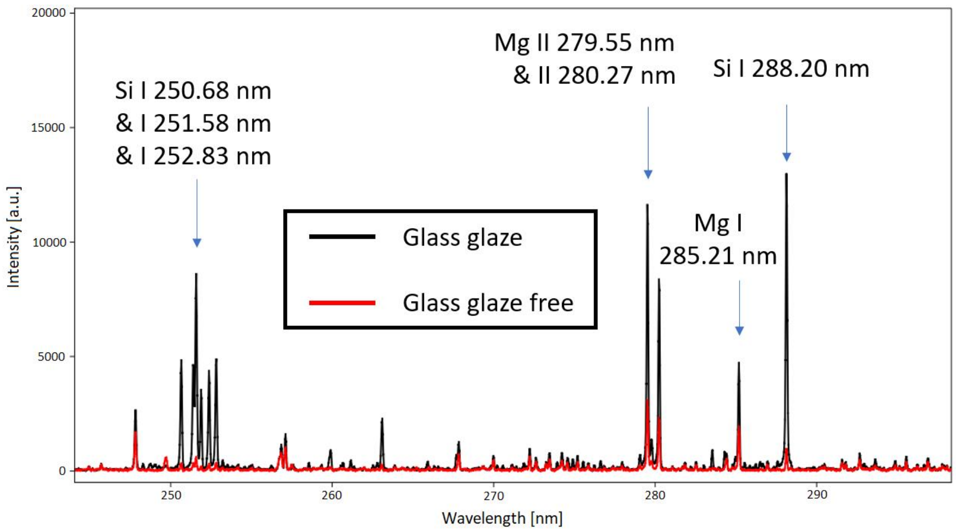


Figure 2: Detection of glass glaze layer on the surface of the ceramic sample

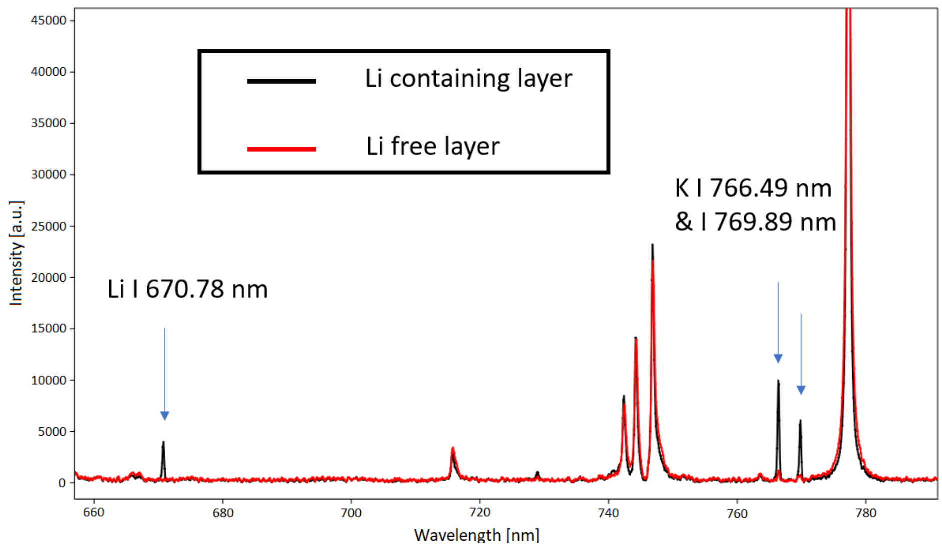


Figure 3: Detection of lithium contamination in the surface layer of the ceramic sample

LIBS Principles

Laser Induced Breakdown Spectroscopy (LIBS) is an optical emission tool for the quick characterization of chemical elements in a broad range of materials, including biological, geological, and ceramic materials. A highly energetic laser pulse is directed at the target sample (Figure 4), resulting in the creation of an expanding microplasma upon impact. This microplasma emits luminous species that provide valuable information about the material composition and the sample environment.

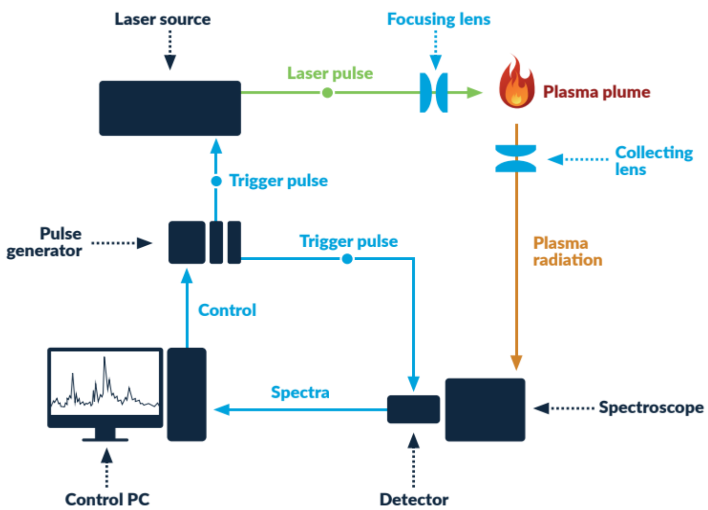


Figure 4: Sci-Trace LIBS set-up scheme