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Laser-induced plasma spectroscopy (LIPS), also known as laser-induced breakdown spectroscopy (LIBS), is a form of atomic emission spectroscopy (AES). Over recent years, LIBS has become an important tool for real-time spectrochemical analysis of a wide variety of materials, with no need for sample preparation. The growing interest in LIBS, particularly in the last decade, has led to an increasing number of publications on its applications, both in the laboratory and in industry. The general conclusion to be drawn from the literature, and agreed among the scientific community, is that the sensitivity of the LIBS technique is poorer than for consolidated analytical techniques and its accuracy needs improvement. Furthermore, the detection limits of LIBS, which are element dependent but in the range of 10-1000 ppm, are not adequate for the analysis of trace elements.

To enhance the LIBS sensitivity, several research groups have proposed and investigated different approaches such as the double-pulse mode, mixed-wavelength, resonance-enhanced LIBS, LIBS coupled to Raman or mass spectrometry, or the combination of LIBS with laser-induced fluorescence spectroscopy (LIFS), also termed laser-excited atomic fluorescence spectroscopy (LEAFS). In LIBS/LIFS, a focused laser beam is used to ablate a sample and form a plasma plume, and after a delay, a second laser, which is tuned to a resonance wavelength of the analyte, excites the atoms in the ablation plume and the fluorescence signal is then detected.

In this presentation, we will present the results obtained by applying the combination of LIBS/LIFS to the detection of lead in copper alloys in air at atmospheric pressure. The LIFS signal was studied as a function of important experimental parameters, and consequently the selectivity and sensitivity of the analysis will be discussed.