Study the Boron Spectrums Induced by Laser Sublimation

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Abstract

This paper is based on the study of the emitted radiation by using LIBS technique (Laser Induced Breakdown Spectroscopy). It is an advanced technique allows analyzing solid, liquid and gaseous materials and it leads to very quick results without any destruction or damage to the sample being analyzed. The application of this technique had performed on Boron sample, by focusing the laser (Nd:yag) with wavelength 1.064nm. The studied experimental spectres are registered from an experimental setup witch carried out by Mr. Florent Bourquard [1]. The experimental spectrum registered is presented in the figure 1. The spectroscopy optical emission is a technique frequently used in the plasmas characterization [2-10]. The study of the emitted light by medium, allow us to collect a lot of information on the plasmas parameters, such as the electronic density and the electronic temperature. To study the experimental spectra, the data bases from atomic physics for all the elements have been set up that may exist in the medium (*BI*, *BII* and *BIII*) and the possible impurities (*CI*, *CII* and *OI*(.The data base gives the concerned energy levels, the statistical weights associated to each energy level, the transitions‘ wave lengths of the radiative transitions probabilities [11]. A numerical program is elaborated to calculate the spectra theoretically; the calculated spectra are presented in the figure 2. Our numerical model allows the identification of several spectral lines. With the Boltzmann method we have calculated the electronic temperature (Te=2.167eV), it corresponds to the classification scale of plasmas. The calculated theoretical spectra are in good agreement with the experimental ones.

Key words: Sublimation, Laser, LIBS, Boron, Plasma, Shape of spectral line, Thermodynamic equilibrium.

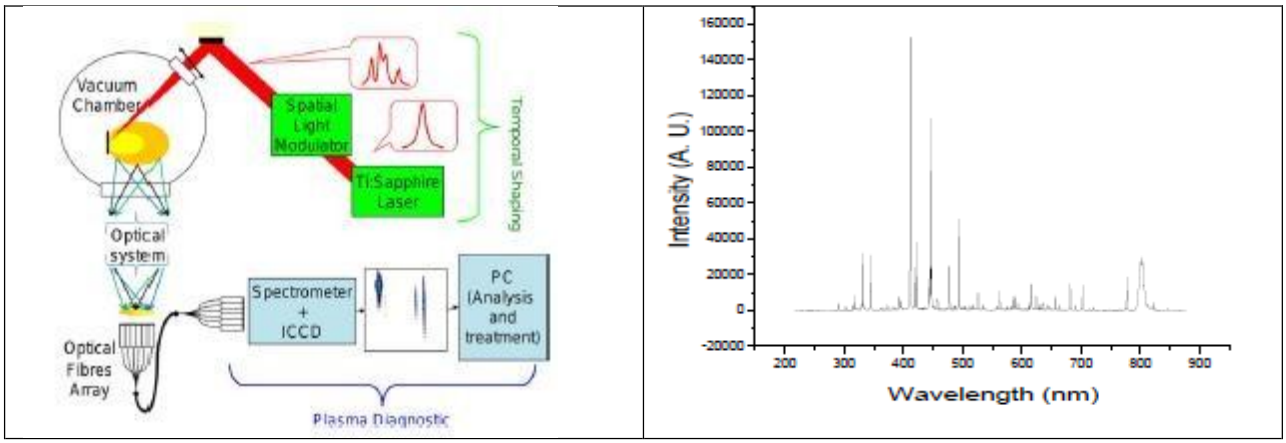

Fig.1: Schematic description of experimental setup and Experimental spectrum resulting of the Boron [1].

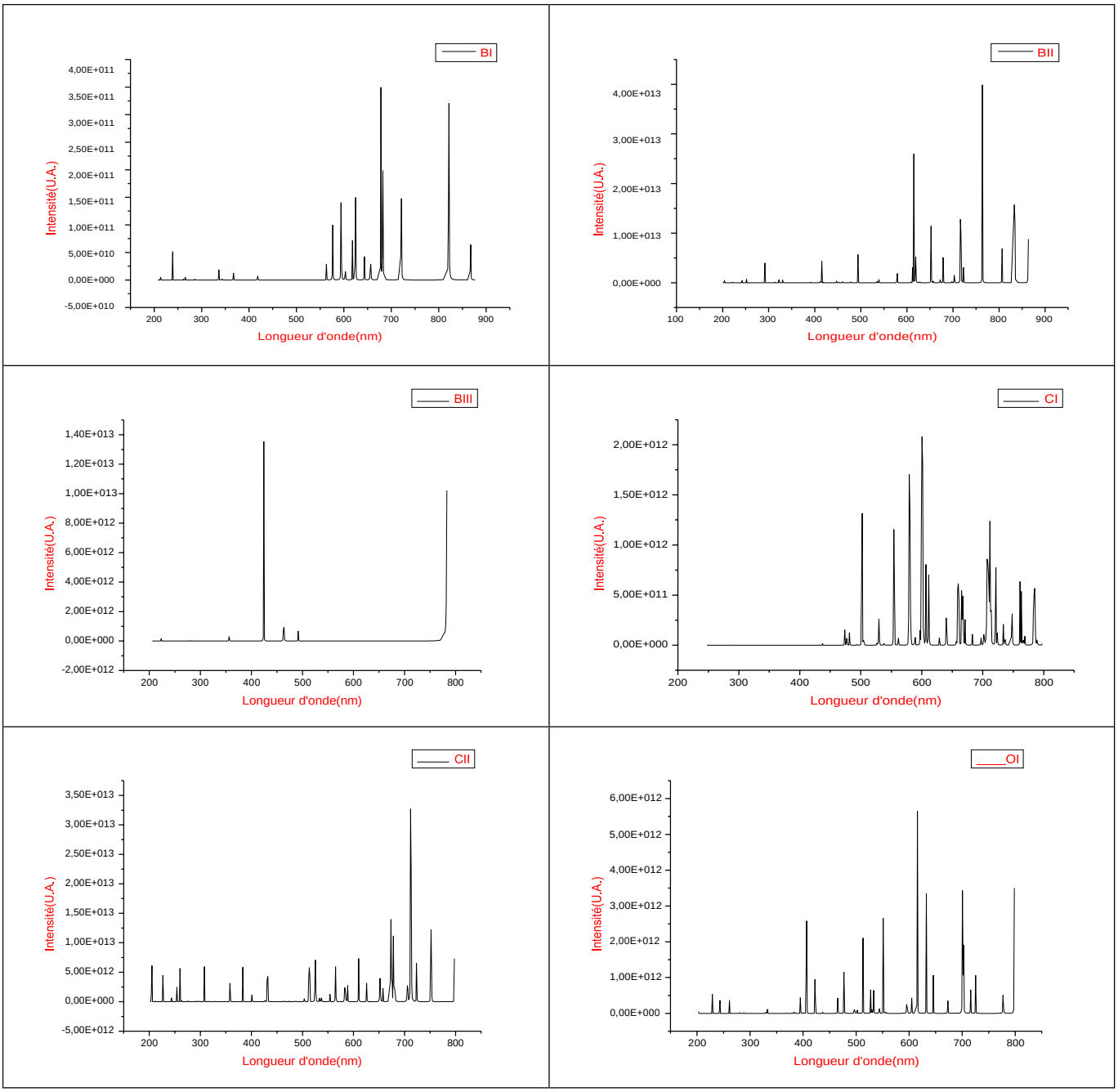

Fig.2:Theoretical Spectra for each element

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