

ELEMENTAL ANALYSIS OF NIGELLA SATIVA VIA LASER INDUCED BREAKDOWN SPECTROSCOPY TECHNIQUE

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INTRODUCTION

The ability to analyze solid sample for direct analysis of agricultural and environmental samples using laser induced breakdown spectroscopy LIBS technique is a well known analysis technique [1-5]. A high energy laser was used to vaporize and atomize a small amount from the target sample to create plasma. Emission of light produced during plasma cooling become signature for each element contain from the sample. The advantage of this technique are including rapidness, capable to analyze all materials (solid, liquid and gas), in-situ or real-time and online analysis, multi-elemental detection, with minimal sample preparation and minor sample damage [5].

We took the opportunity of these advantages to analyze *Nigella sativa*. The samples were pelletized using Herzog press machine by applying 40 kN load for 5 minutes. The dimension of the final pellet is approximately 4 mm in thickness with diameter of 40 mm. A Q-switched Nd:YAG laser (1064 nm, 90 mJ per pulse, repetition rate 1 Hz) was employed as a source of plasma. Maya 2000Pro spectrometer associated with SpectraSuite software and Origin 7 software were used to analyze the constituent elements of *Nigella sativa*. Measurements were performed at five different locations on the pellet surface to minimize sample microheterogeneity problems and the average of these measurements were presented as fingerprint for each of existing element. The atomic spectroscopic of the *Nigella sativa* was identified using database provided by National Institute of Standard and Technology (NIST) of Atomic Spectra Database. The concentration pattern of the elements is observed from the intensity of emission spectral lines [6].

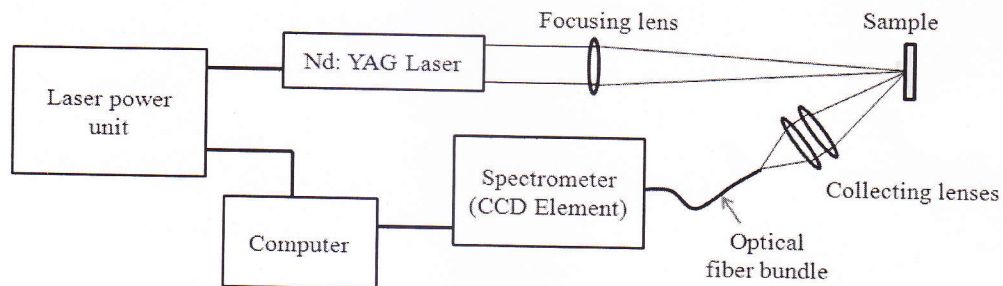


Figure 1. LIBS system setup

MAIN RESULTS

The emission lines of *Nigella sativa* sample is assumed to have minimal interference, hence self-absorption was almost absent. The LIBS spectra of the sample is presented in **Figure 2**. The emission spectra contain atomic emission lines of atoms and ions of Cu, Fe, Co, Cr, Ca and Na which is in good agreement with previous results. The presence of atomic lines of Ti, C, Hf and U are also realized.

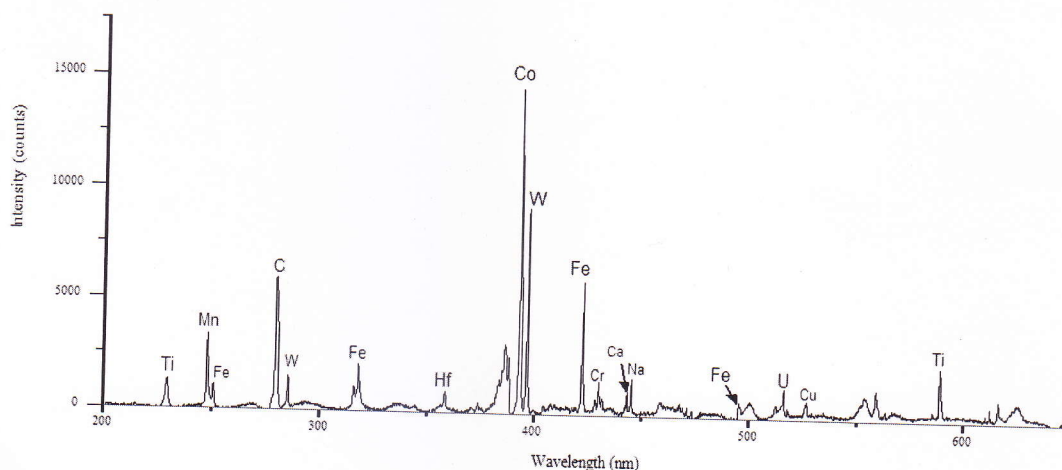


Figure 2. LIBS spectral line emission of the *Nigella sativa* sample.

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