PHYSICAL CHEMISTRY 2010

2nd Workshop

SPECIFIC METHODS FOR FOOD SAFETY AND QUALITY

September 21, 2010, Vinca Institute of Nuclear Sciences, Belgrade, Serbia

BOOK OF ABSTRACTS

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APPLICATION OF TIME RESOLVED LASER-INDUCED FLUORESCENCE MEASUREMENTS AND LASER INDUCED BREAKDOWN SPECTROSCOPY FOR DEVELOPMENT OF NEW METHODS FOR FOOD QUALITY CONTROL

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The aim of this presentation is to show possibilities of use of combined time resolved laser induced fluorescence (TR-LIF) and laser induced breakdown spectroscopy (LIBS) system for development of new methods for food quality control. The TRLIF/LIBS system is implemented in our laboratory.

Time-resolved laser-induced fluorescence (TR-LIF) has been shown to be a method which is fast and sensitive to provide information about the proteins and molecules significant for bioanalytical and chemical processes. Capabilities of TR-LIF/LIBS system implemented in our laboratory will be illustrated by presenting some of images acquired in the process of tuning the system.

A number of studies have appeared on the detection, spectroscopy and lifetime measurements of organic molecules based on laser-induced fluorescence (LIF) techniques [1, 2]. This technique is one of the most sensitive approaches in research for a variety of analytical applications in the fields of life sciences, biophysics and biomedical applications [3, 4]. LIBS technique could be useful for detection of toxic elements in food.

A detailed description and some of the preliminary results of our TRLIF/LIBS are given in [5-8]. Shortly, pulsed excitation is provided by a tunable Nd-YAG laser system (Vibrant model 266 made by Opotek, Inc.) with pulse duration of 5.4 ns, pulse repetition rate of 10 Hz and energy per pulse of up to~350 mJ. This system incorporates the optical parametric oscillator (OPO) that is pumped by the fourth harmonics of the Nd:YAG Brilliant laser at 266 nm. The output of the OPO can be continuously tuned over a spectral range from 320 nm to 475 nm. The laser induced fluorescence in the samples is recorded using streak scope (Hamamatsu model C4334-01) with integrated video streak camera. The fundamental advantage of the streak scope is its two dimensional nature, that is especially important in measuring time-resolved fluorescence spectra. The data have been acquired using HPD-TA software.

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