Electron Controlled Chemical Lithography

2009 Meeting

4th-9th June 2009
Istanbul, Turkey

ABSTRACT BOOKLET

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IN SCIENCE AND TECHNOLOGY

Electron Controlled Chemical Lithography 2009 Meeting
4th-9th June 2009
Istanbul, Turkey

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MEASUREMENT OF LASER-INDUCED FLUORESCENCE OF MOLECULES USING A TIME-RESOLVED SPECTROMETAR

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Measurements of laser induced fluorescence (LIF) for several known strong fluorescing molecules have been performed in order to achieve the calibration of new experimental apparatus designed for study of molecules of biological relevance. Depending on the specific application, fluorescence measuring systems strongly differ in instrumental design, i.e. use of optical components, detection systems as well as in measurement geometries including the sample cell. Proper calibration of the system that comprises excitation laser, optical cell and detection system is therefore necessary in order to obtain accurate signal interpretation. Optical emission spectroscopy represents comparative experimental technique to the optical absorption and low energy electron spectroscopy techniques in present kind of study [1].

Here, we report various approaches for the calibration of the time-resolved laser-induced fluorescence (TR-LIF) detection system. This system is based on the tunable Nd:YAG laser (320-475 nm) to excite samples and on the detection part with high spatial and temporal resolution [2]. Different methods for calibration of time domain and wavelengths are known [3-5] and the possibility of theirs application to our TR-LIF system has been presented. Feasibility of some methods will be tested with standard fluorescent dyes, such as fluorescein which is intended for use in establishing a reference scale for fluorescence intensity [6]. Also, rhodamine B is used as a common dye to investigate a fluorescence yields and lifetimes. The amount and wavelength of the emitted energy depend on both the fluorophore and the chemical environment. This technology has particular importance in the field of biochemistry and protein studies. Fluorescence spectroscopy is increasingly being used as a technique for probing the structure and dynamics of nucleic acids. Recently, fluorescence methods have been used to elucidate the three-dimensional arrangement of complex DNA and RNA structures [7]. The systematic errors in calibration procedure will be also discussed.

References

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MEASUREMENT OF LASER-INDUCED FLUORESCENCE OF MOLECULES USING A TIME-RESOLVED SPECTROMETAR

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Measurements of laser induced fluorescence (LIF) for several known strong fluorescing molecules have been performed in order to achieve the calibration of new experimental apparatus designed for study of molecules of biological relevance. These include batanin ($C_{24}H_{27}N_2O_{13}$), fluorescein ($C_{20}H_{12}O_5$), rhodamine 6G ($C_{28}H_{31}N_2O_3Cl$) and B ($C_{28}H_{31}ClN_2O_3$) dyes. Optical emission spectroscopy represents comparative experimental technique to the optical absorption and low energy electron spectroscopy techniques in present kind of study [1].

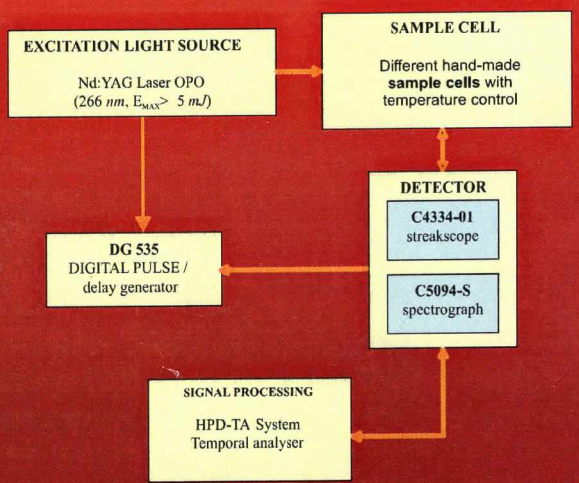

Fig. 3. Block diagram of optical spectrometer

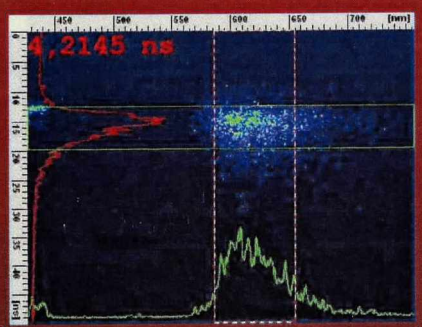

Fig.1. Spectrum obtained using rhodamine with visible 440 nm excitation laser beam.

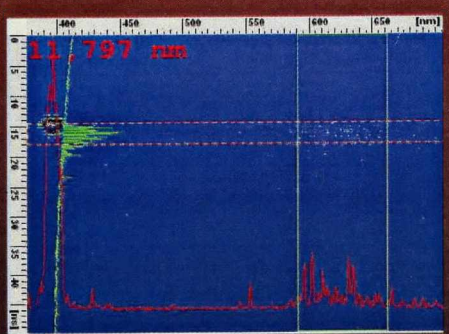

Fig. 2. Spectrum obtained using bethanine with 400 nm excitation laser beam wich is also visible.

The calibration of the time-resolved laser-induced fluorescence (TR-LIF) detection system had bee performed. This system is based on the tunable Nd:YAG laser (320-475 nm) which excites samples and on the detection part with high spatial and temporal resolution [2]. Different methods for calibration of time domain and wavelengths are explore [3-6]. This technology has particular importance in the field of biochemistry and protein studies. Fluorescence spectroscopy is increasingly being used as a technique for probing the structure and dynamics of nucleic acids. Recently, fluorescence methods have been used to elucidate the three-dimensional arrangement of complex DNA and RNA structures [7].

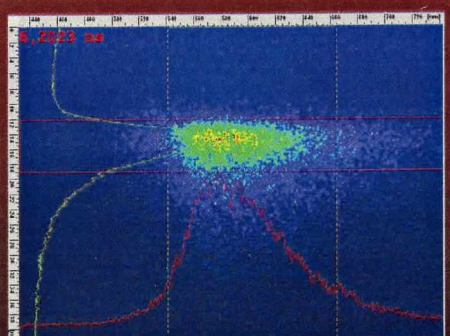

Fig.4. Spectrum obtained using fluorescein in alcohol.

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