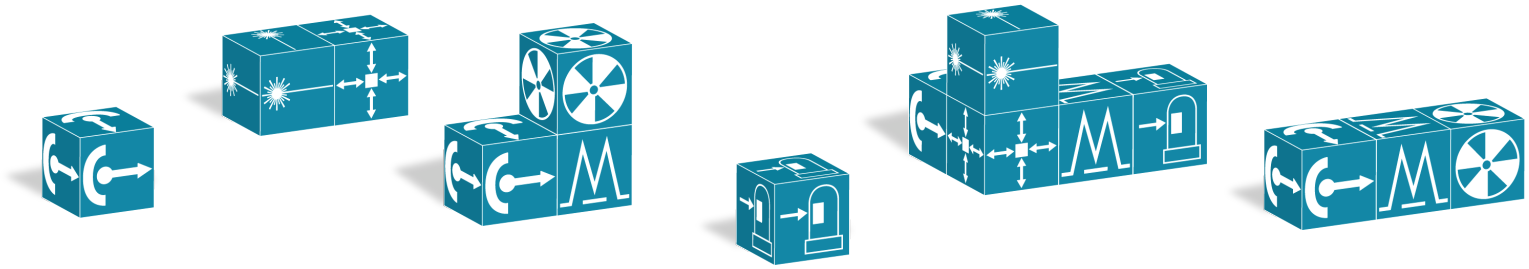


EasyLife™ X

Bench-top Luminescence Lifetimes

Optical Building Blocks

www.obbcorp.com

EasyLife™ X

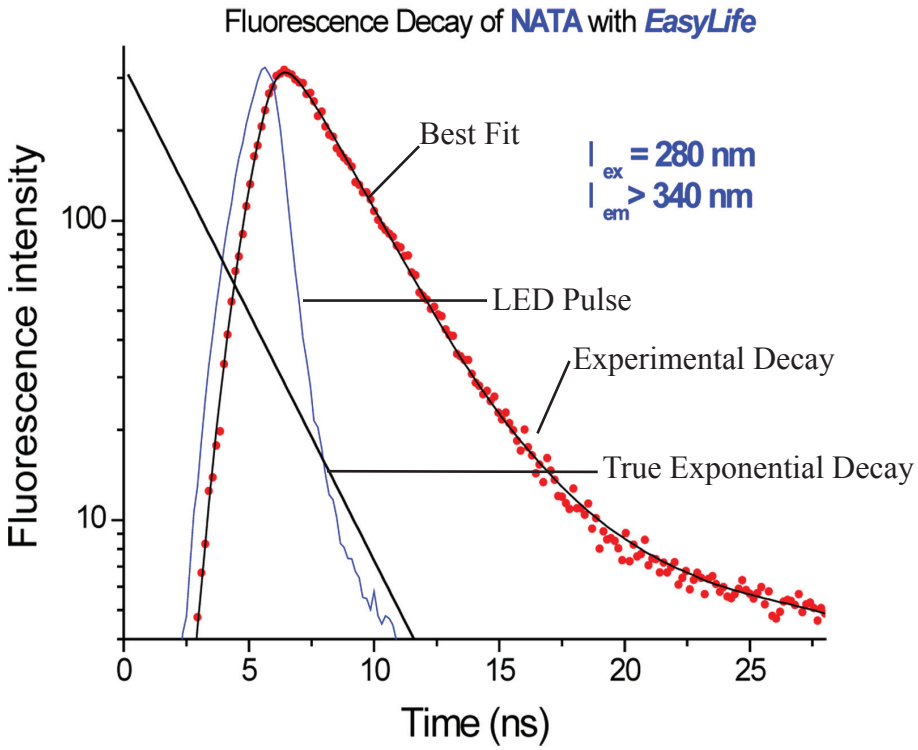
General Information

EasyLife™ X Offers Easy Solutions For Your Applications
The EasyLife™ X is an integrated solution that provides answers that you have been unable to obtain until now! Using our patented lifetime fluorescence technique, the EasyLife™ X obtains the maximum information about any molecule, something you simply cannot get with conventional steady state techniques. Whether you are involved in biology, chemistry, pharmaceutical science, food technology, or materials science your work will be greatly enriched by utilizing the EasyLife™ X.

Why Measure Time Resolved Fluorescence?

An important advantage of acquiring lifetime measurements is that they are an “intrinsic” molecular parameter. As a result, the lifetime value is independent of fluorescence intensity that can suffer losses due to light scattering and depends on local probe concentration. Therefore, the lifetime measurement is much more informative and reliable when studying highly scattering and solid samples.

In the steady state measurement alone, measured parameters such as spectra, intensity, and polarization are time averaged and the information about dynamic processes is lost. This missing information becomes especially important when fluorescent molecules are used as probes to study complex systems. These systems, including proteins, nucleic acids, membranes, polymers, and micelles frequently exhibit multiple structural domains and conformations. The use of time resolved fluorescence will reveal this information by detecting multiple lifetimes, which reflect structural diversity and interactions.



Principles of Lifetime Determinations

Why do you need the EasyLife™ X?

The EasyLife™ X adds a new dimension to many research areas by utilizing time resolved fluorescence techniques, which have never been so affordable or easy to execute.

The superior performance of the EasyLife™ X allows measurements on the picosecond and nanosecond timescales, unravelling processes unavailable from conventional fluorescence measurements.

Applications

Ideal for use with biological fluorescent probes to study:

Protein structure dynamics
Protein-Protein interactions
Protein ligand binding
Enzymatic assays
Biomembranes
Nucleic acid conformation
Nucleic acid interactions
Photosynthesis
Liposomes and lipids

And more.....

EasyLife™ X is also an excellent choice for:

Molecular sensors
TR FRET
Material quality control
Quantum dot research
Laser dyes characterization
Development of MLC probes
Photosensitizers research

And more....

The Stroboscopic Technique (Strobe)

This is the most recent and electronically the simplest technique. While the technique is the newest, it is already more than 10 years old and well established and validated. It utilizes a pulsed light source (an LED, a laser diode or a nitrogen/dye laser) and measures fluorescence intensity at different time delays after the pulse. As a result, a fluorescence decay curve is collected. The diagram below shows the basic elements of a strobe instrument that utilizes a pulsed LED.

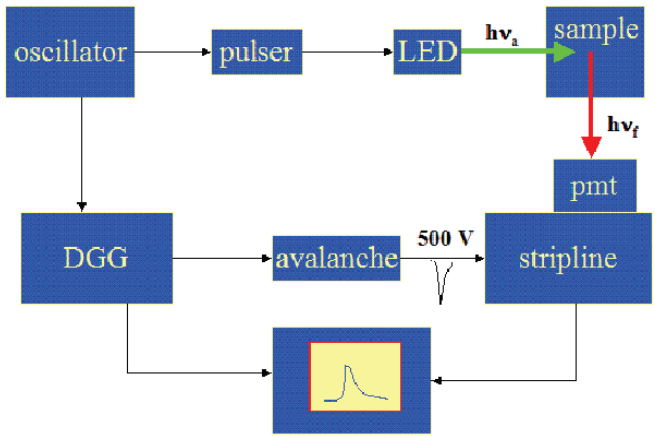


Fig. 1 Block diagram of an LED-based EasyLife stroboscopic system

A master clock (oscillator) generates pulses at a fixed 25 kHz frequency. The pulses are routed simultaneously to the LED pulser and a digital delay gate generator (DGG) unit.

The pulser triggers the LED; the LED flashes and excites the sample, which subsequently emits fluorescence. At the same time the pulse synchronized with the LED pulse triggers the DGG, which outputs a delayed TTL pulse.

The DDG is under computer control and the value of the TTL pulse delay is determined in the acquisition software. The delayed pulse triggers an avalanche circuit, which provides a high voltage pulse (ca. 500 V) for the detection circuitry. This pulse creates the gain and the temporal discrimination gate for the photomultiplier.

An important feature is that the strobe technique does not use a conventional voltage divider network for providing inter-dynode voltages in the photomultiplier (PMT). Instead, the PMT dynodes are interconnected by a stripline circuit. The pulse from the avalanche is injected in the stripline at the time delay specified by the DGG. The pulse travels along the dynode chain amplifying the primary photoelectrons generated at the specific time delay. This way high amplification and time gating are simultaneously achieved in the PMT strobe circuit. The measured analog signal is fed to a 12-bit A/D converter. Scanning the gate (time delay) across the fluorescence decay allows the acquisition of fluorescence intensity as a function of time.

One of the advantages of the stroboscopic technique is the ability to utilize relatively inexpensive pulsed LEDs.

The strobe technique can also be very fast; this is because it measures fluorescence intensity directly and, unlike photon counting techniques, is not limited by photon counting statistic and can therefore take advantage of high intensity fluorescence.

A unique feature of the strobe is the ability to measure decays with the use of non-linear timescale. This is possible because the software controls the delayed output of the DGG. The stroboscopic instruments employ arithmetic progression and logarithmic timescale acquisition protocols in addition to the conventional linear timescale. These non-linear timescale protocols enhance the lifetime resolving power and allow for the acquisition of complex decays with underlying lifetimes differing by orders of magnitude using fewer data points than would be required with the linear timescale.

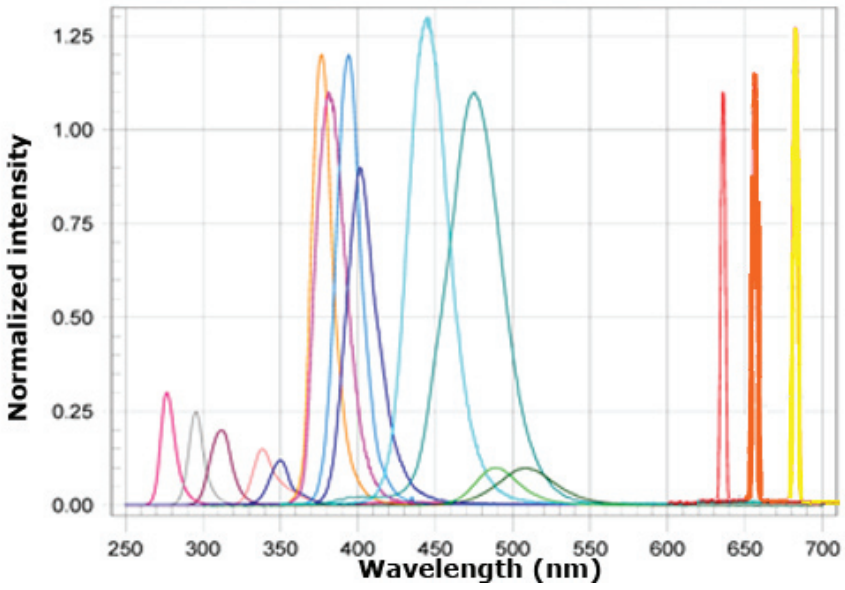
EasyLife™ X

LED's and Laser Diodes

OBB engineers have developed a broad range of proprietary pulsed light emitting diodes (LEDs) to be used as excitation sources with the EasyLife systems. These small but robust light sources are available in a broad range of wavelengths, from UV to NIR

To exchange sources is real easy, just snap off and then snap on and it is done – no alignment required.

EasyLife LED Spectra



LED Sources

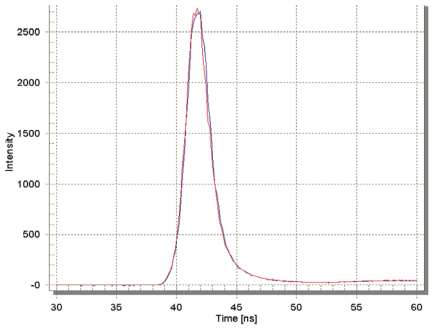
Central Wavelength / Type

- 265 nm LED
- 280 nm LED
- 295 nm LED
- 310 nm LED
- 340 nm LED
- 365 nm LED
- 370 nm LED
- 380 nm LED
- 393 nm LED
- 405 nm LED
- 410 nm LED
- 435 nm LED
- 445 nm LED
- 450 nm LED
- 460 nm LED
- 505 nm LED
- 525 nm LED
- 635 nm Laser Diode
- 650 nm Laser Diode
- 670 nm Laser Diode

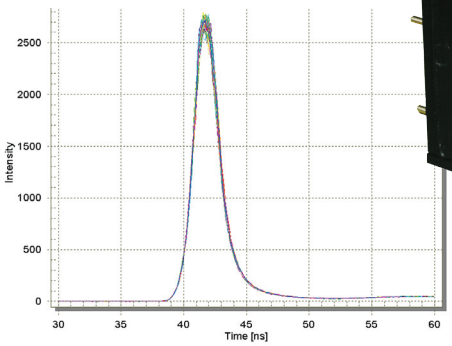
Other LED's and laser diodes are available on request.

Reproduciblity

6 Hours Repeat Acquisition



Repeat After 4 Days

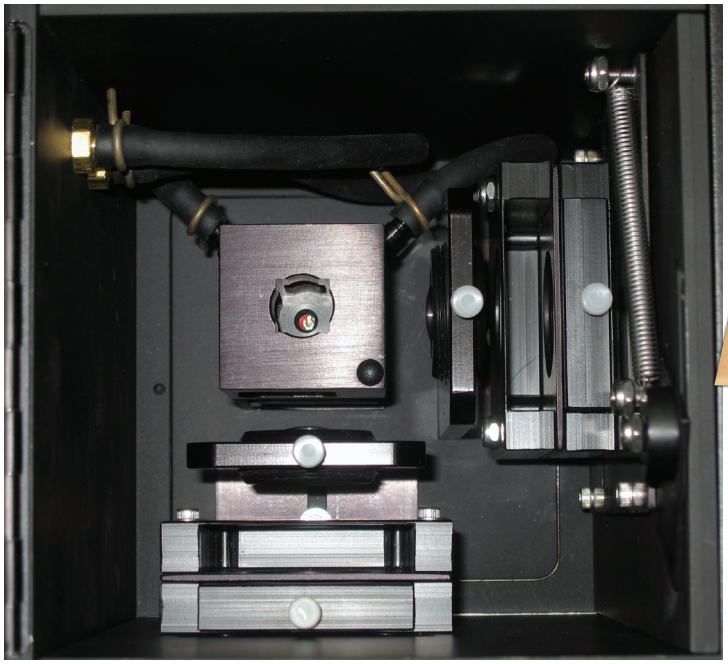


Optional Accessories

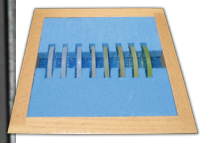
- Magnetic stirrer
- Manual sheet polarizers
- Bandpass filters
- Liquid nitrogen dewar
- Solid sample holder
- Long-pass filters
- Neutral density filters
- Microcuvette with adapter

Compact Sample Compartment

Standard
Thermostatable
Sample Holder



Standard
Lid Activated
Shutter



Standard
Focusing Optics

Standard
Mounting Hardware For Filters and/or Polarizers

The sample compartment is compact but it has plenty of room to accommodate what you need to make a host of various sample measurements.

PMT Options

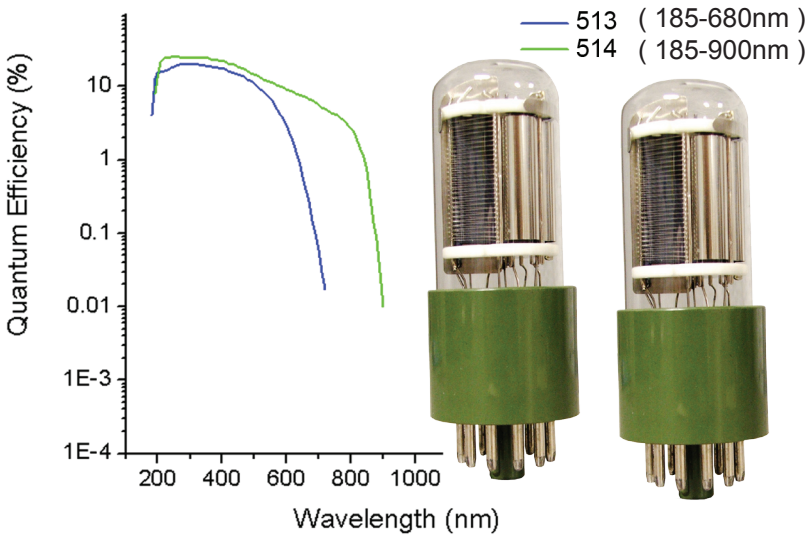
- Extended IR version

The standard system uses a specially selected PMT that allows for the measurement of lifetimes from 100 picoseconds to 3 microseconds. The wavelength range of detection is from 185 nm to 680 nm.

At the time of order you may select, as an option, an extended wavelength range PMT tube that can detect from 185 nm to 900 nm

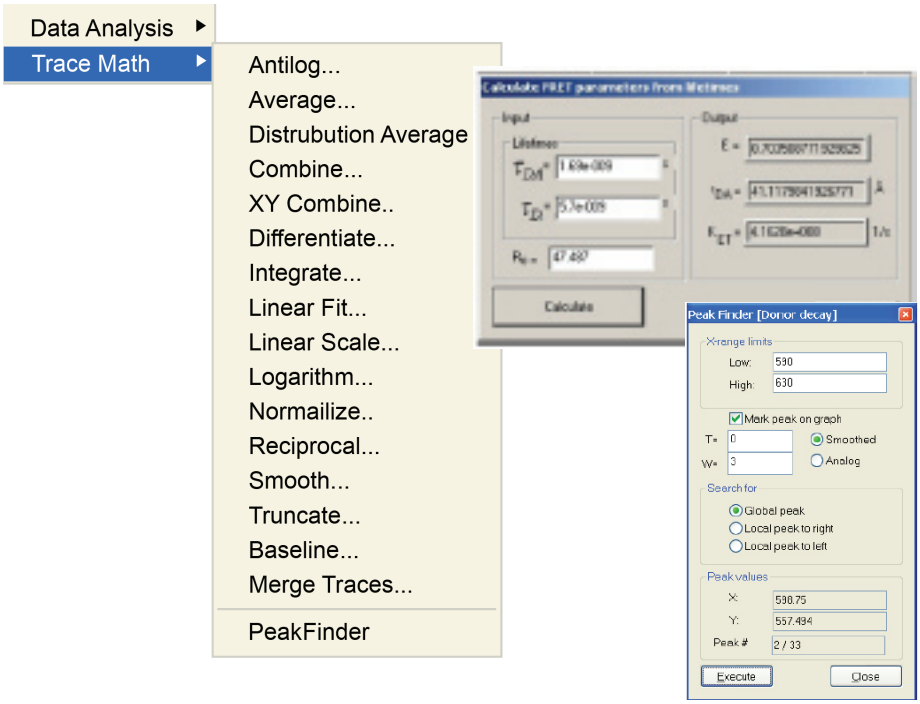
Detector Options

Quantum efficiencies of OBB pmt detectors

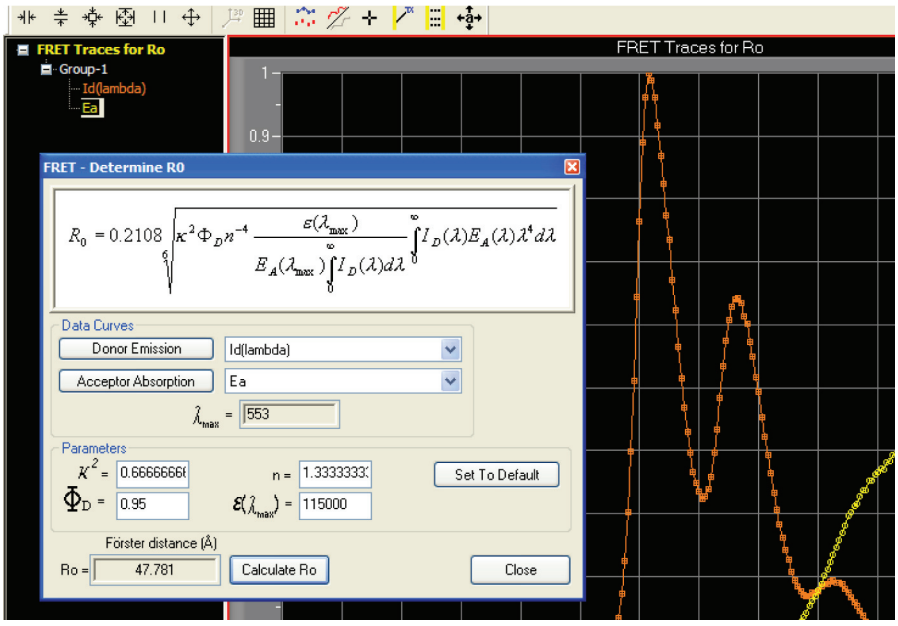


EasyLife™ X

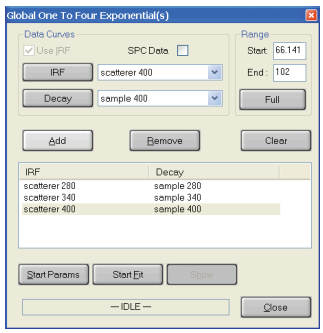
Math Features



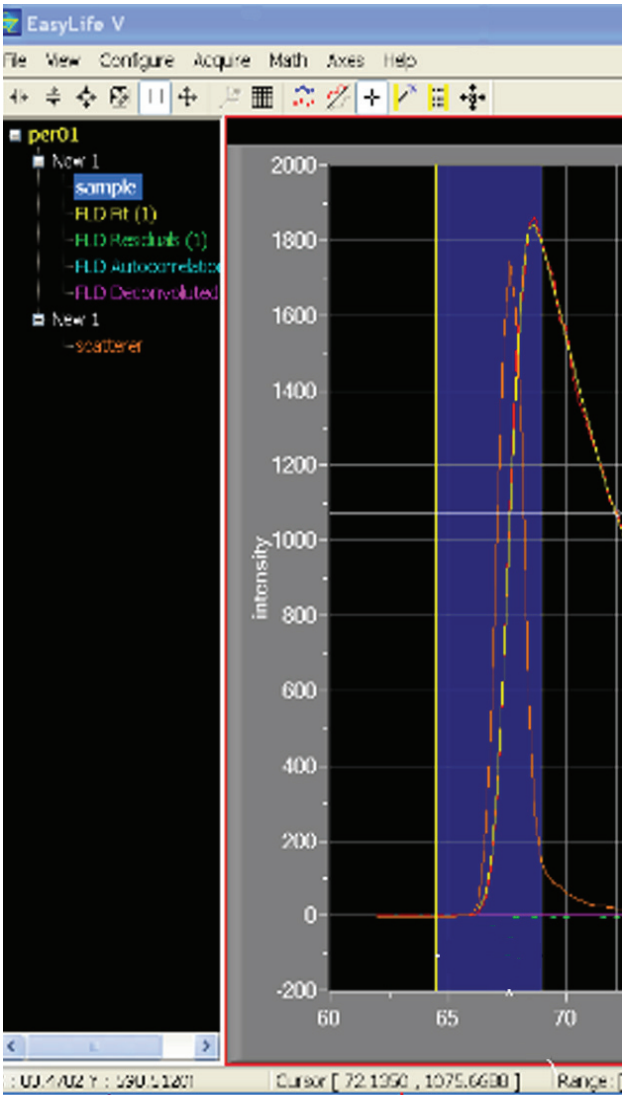
Built In FRET Calculator



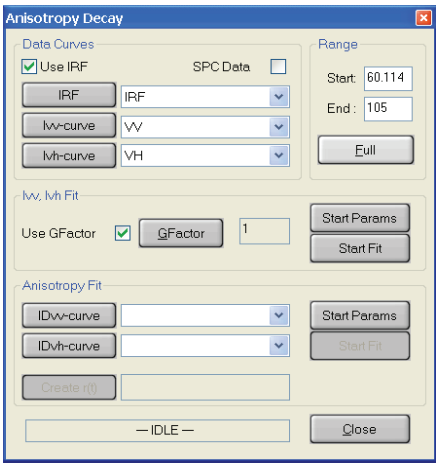
Global Analysis



EasyLife™ X Software desig

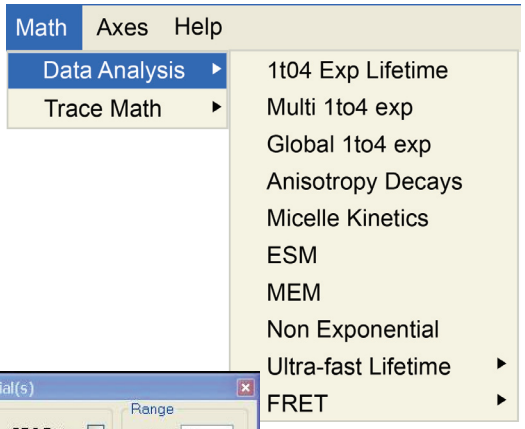


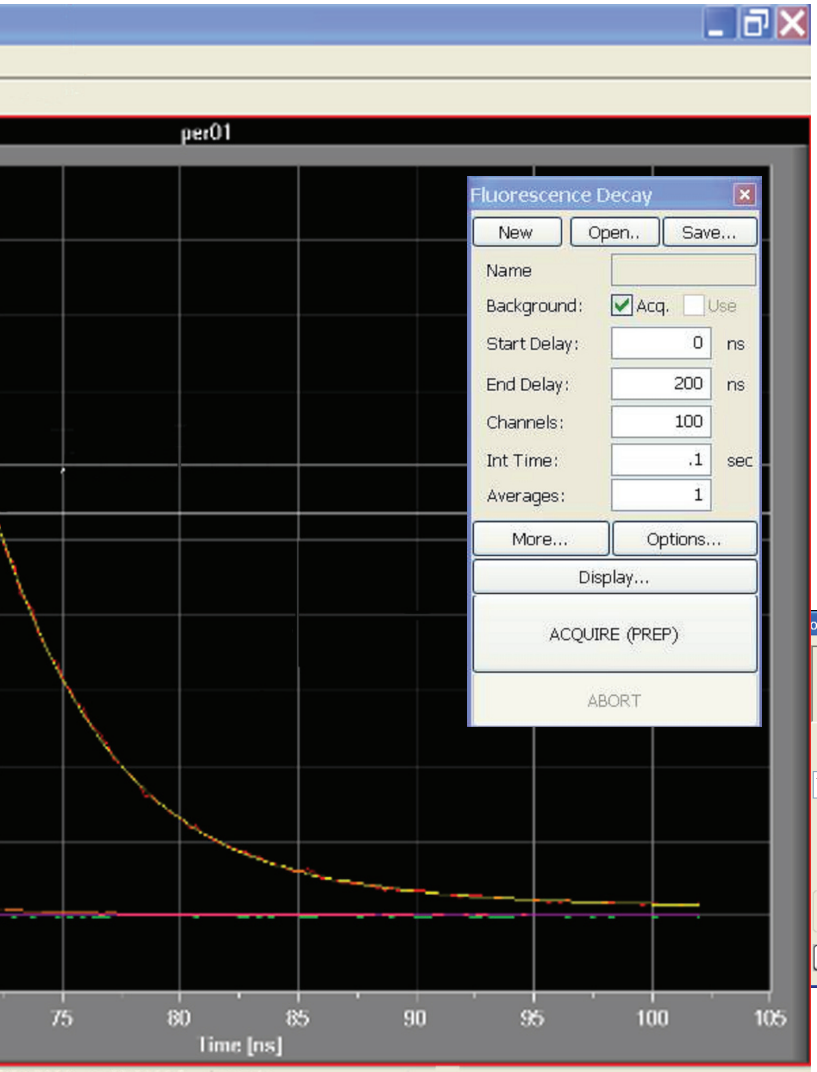
Anisotropy

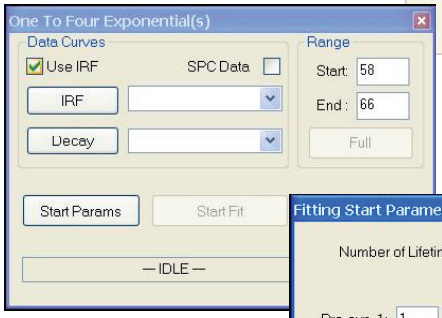


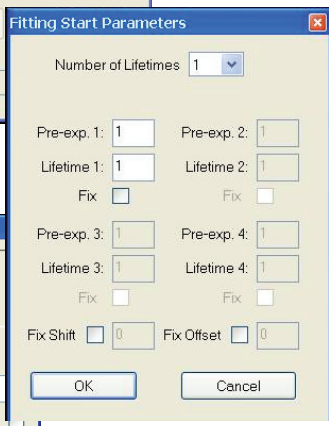
gned for ease of Use

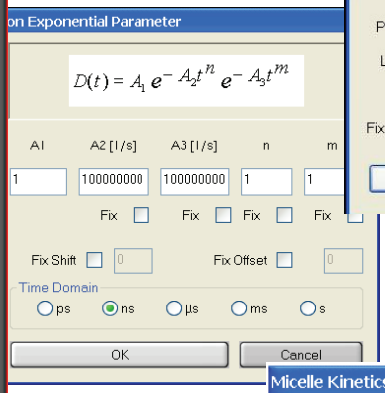
Data Analysis



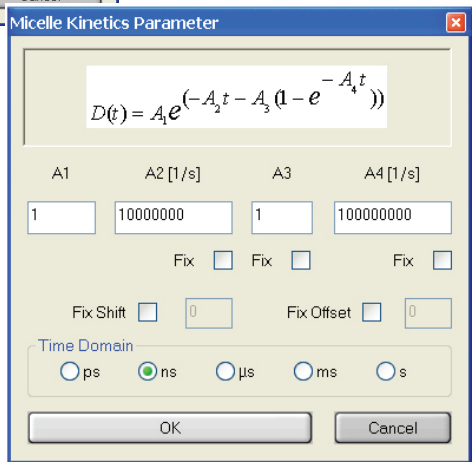


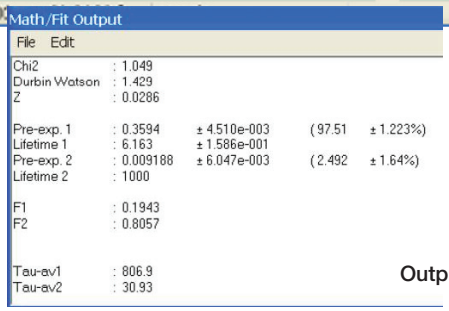




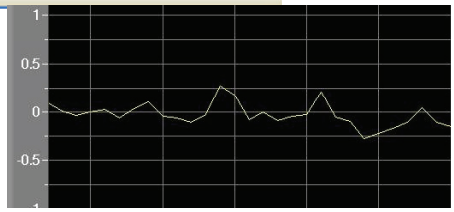


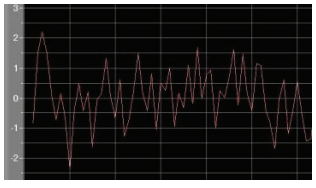
Micelle Kinetics





Output





Chi2
Random Residuals

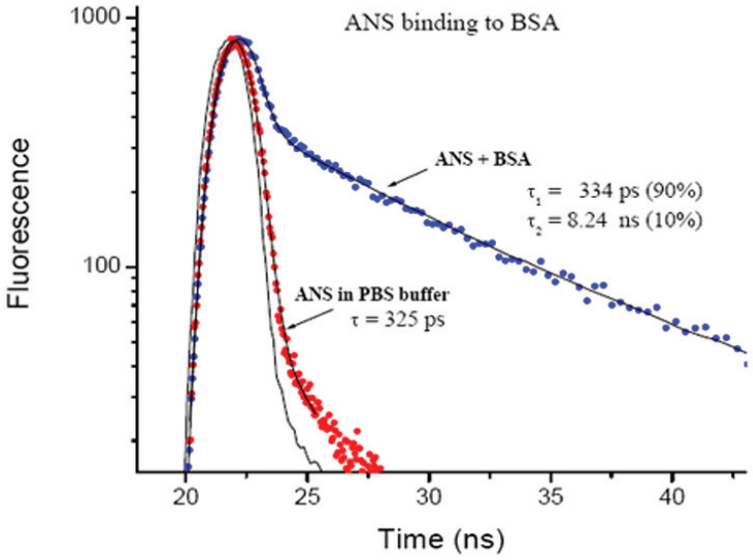
And so much more....

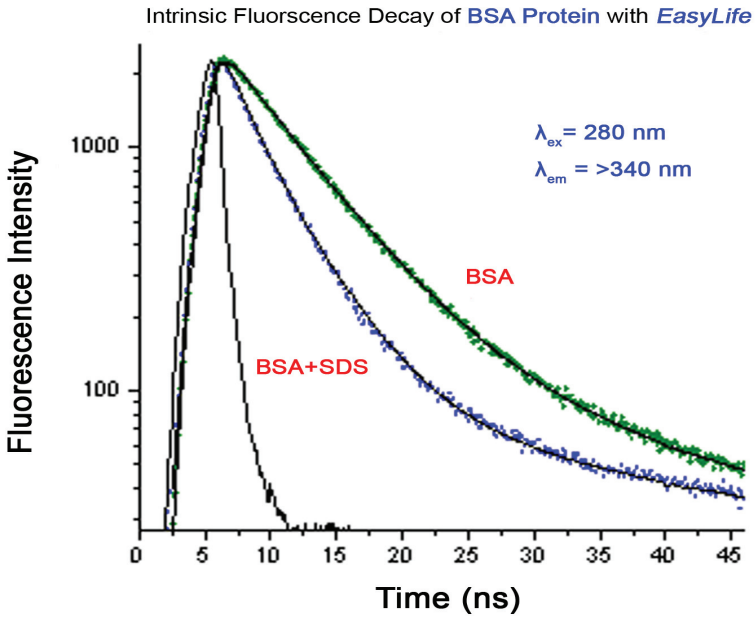
Applications

Proteins

Most proteins fluoresce due to the presence of any or all three fluorescent amino acids: tryptophan, tyrosine, and phenylalanine. Intrinsic time-resolved fluorescence of tryptophan is commonly used to study the structure and dynamics of proteins. These experiments require pulsed light sources emitting in the UV, between 270 and 295 nm. The EasyLife™ X, equipped with the 280 or 295 nm pulsed LED source, is a very robust yet fast instrument perfectly suited for use with tryptophan and tyrosine fluorophores.

If you happen to use external fluorophores, there is a large selection of pulsed LEDs available for any wavelength in the UV-VIS range. A polarity sensitive, hydrophobic probe such as ANS is a good illustration of binding of an extrinsic probe to a protein. ANS binding to bovine serum albumin was monitored with the EasyLife™ X equipped with the 370 nm LED. The lifetime of ANS in the buffer is very short, 325 ps, and increases to 8 ns upon binding to BSA. The ratio of free ANS to BSA bound ANS (9:1) can be easily determined from the double exponential fit to the fluorescence decay.





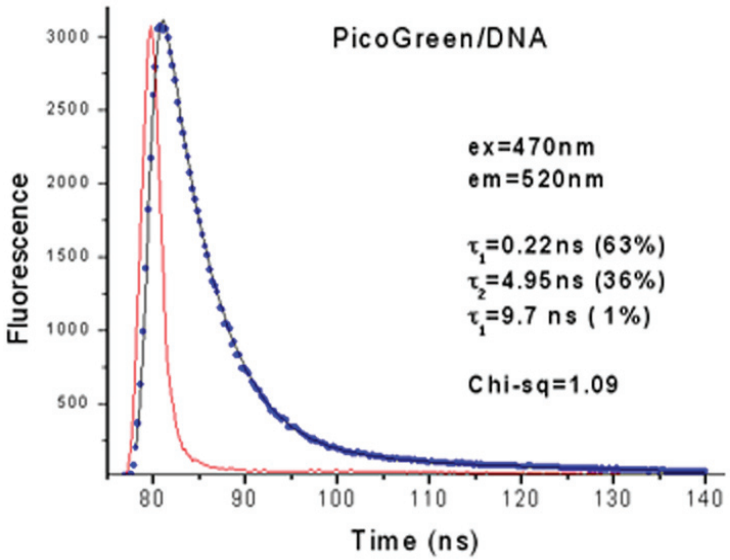
Fluorescence decays of bovine serum albumin (BSA) in PBS buffer were measured with the EasyLife™ X. The native protein shows a nearly single-exponential decay with an average lifetime of 6.31 ns. After being treated with SDS detergent, BSA undergoes a structural transition and its fluorescence decay exhibits two shorter lifetimes, 1.47 ns (37%) and 4.43 ns (63%).

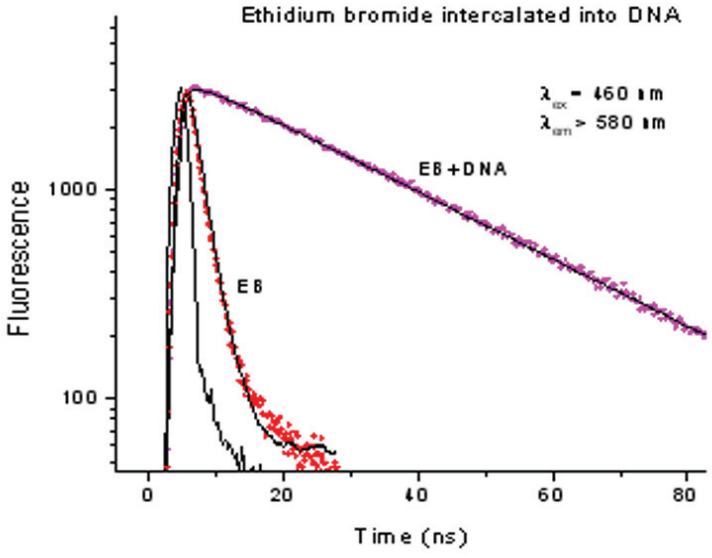
Applications

Nucleic Acids

If you study conformational features or hybridization of DNA, the EasyLife™ X is the right system for you. A probe molecule in a buffer will show very little or no anisotropy. Attach it to a protein, DNA, or membrane, however, and the anisotropy is increased. This is all that the steady state experiment can tell you: the probe is attached to a much bigger entity. However, if you measure the lifetime of the probe, you can estimate the rate of rotational diffusion in addition to the size of the macromolecule that is attached to the probe.

Ethidium Bromide (EB) is a commonly used DNA probe, which readily intercalates between the DNA bases. EB is weakly fluorescent in aqueous media, but becomes strongly fluorescent after intercalation into DNA. The lifetime of EB in buffer is 1.71 ns and increases dramatically to 22.7 ns after binding to calf thymus DNA.





Fluorescence decay of PicoGreen/DNA measured with an EasyLife™ X lifetime system. Conformational diversity may result in multiple lifetimes of the probe bound to DNA. The EasyLife™ X is fully capable of measuring and analyzing such complex decays. The decay of PicoGreen, a common probe for double-stranded DNA, exhibits a clearly multi-exponential behavior, resulting in three lifetimes that range from 220 ps to 9.7 ns.

EasyLife™ X

OEM

One of Optical Building Block Corporation's major markets is for O.E.M applications. Whether its supplying standard off the shelf products, modified products or completely custom designed new products, OBB Corp. has the development team of engineers and scientists to meet your specific needs. Subsequent to the development OBB Corp has the manufacturing capability to produce the product efficiently, reliably and economically in any quantity that you may need.

Our technical expertise resides in developing:

- Specialized light sources
- Monochromators
- Spectrographs
- Microscope accessories
- Low light or fast detection from UV to NIR
- Specific luminescence, fluorescence, phosphorescence systems for use with reagents
- Polarimeters
- Software related to instrumentation control and analysis

In general we specialize in equipment related to the application and uses of light.

OBB has a policy of continuous product development and reserves the right to amend part numbers, descriptions and specifications without prior notice.

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