EasyLife V™

EasyLife V™ Complements your fluorescence intensity measurements

EasyLife V™ Offers Easy Solutions For Your Applications

The EasyLife V™ is an integrated solution that provides answers that you have been unable to obtain until now! Using our patented lifetime fluorescence technique, the EasyLife V™ 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 V™.

Take A Close Look At EasyLife V™ – OBB's New, Amazingly Simple, Powerful, Yet Affordable Solution Machine.

- Picomolar sensitivity
- Lifetimes from less than 100 ps
- Powerful software with FRET Calculator
- Large selection of state-of-the-art pulsed LEDs
- Small footprint (a coffee table will suffice!)
- Fully portable
- Turn-key operation
- Maintenance free
- Priced below steady state

Optical Building Blocks Corporation

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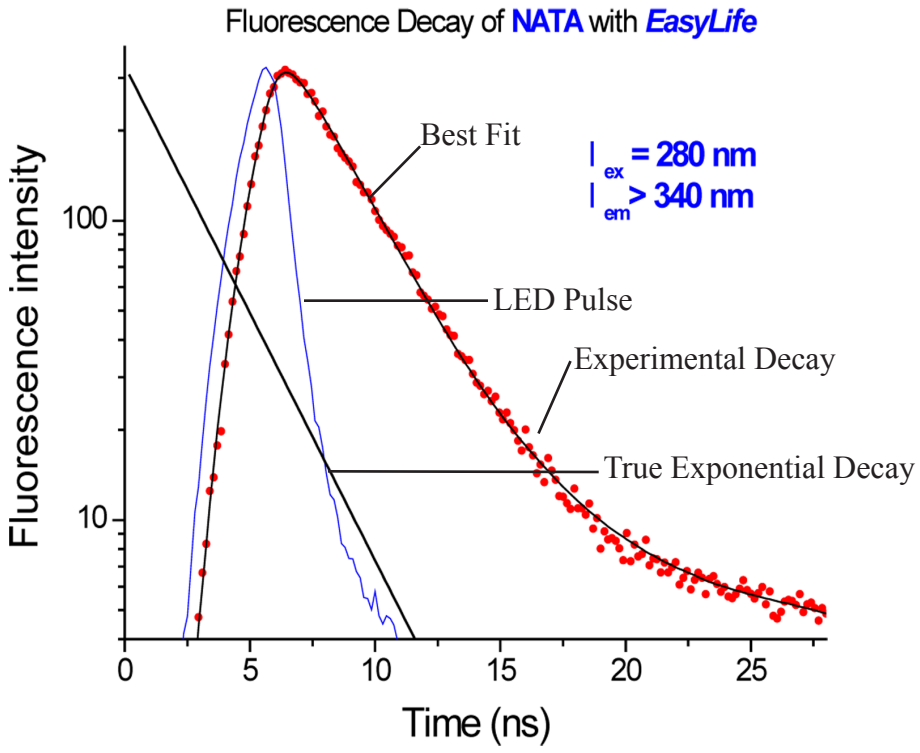
Why Measure Time Resolved Fluorescence?

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

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 V™ 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....

Why do you need the EasyLife V™?

The EasyLife V™ 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 V™ allows measurements on the picosecond and nanosecond timescales, unravelling processes unavailable from conventional fluorescence measurements.

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.

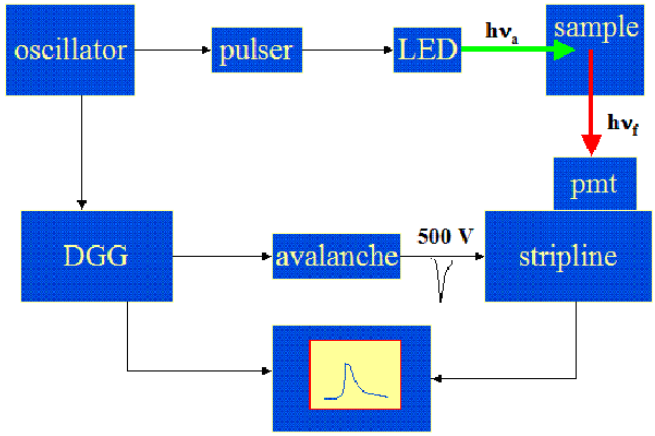


Fig. 1 Block diagram of an LED-based EasyLife stroboscopic system

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.

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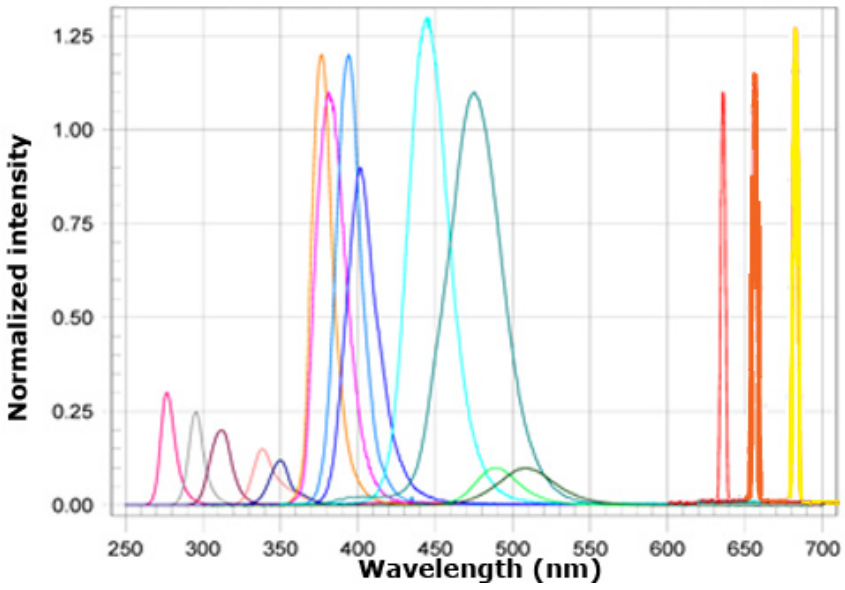
LED's and Laser Diodes

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

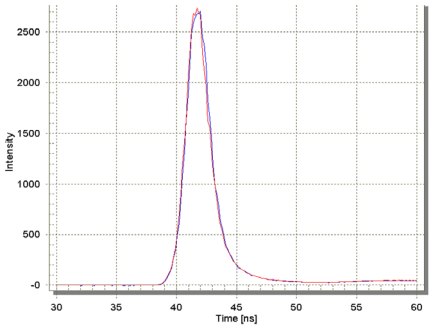
To exchange sources is real easy, just snap off and then snap on and it is done – no alignment required.

EasyLife LED Spectra

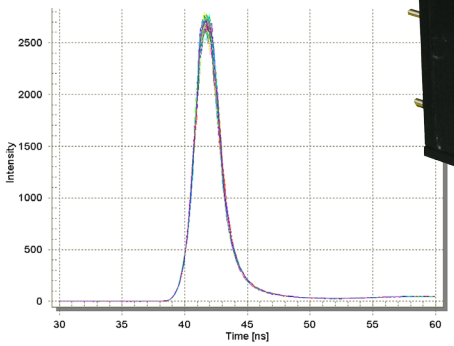


Reproduciblity

6 Hours Repeat Acquisition



Repeat After 4 Days



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

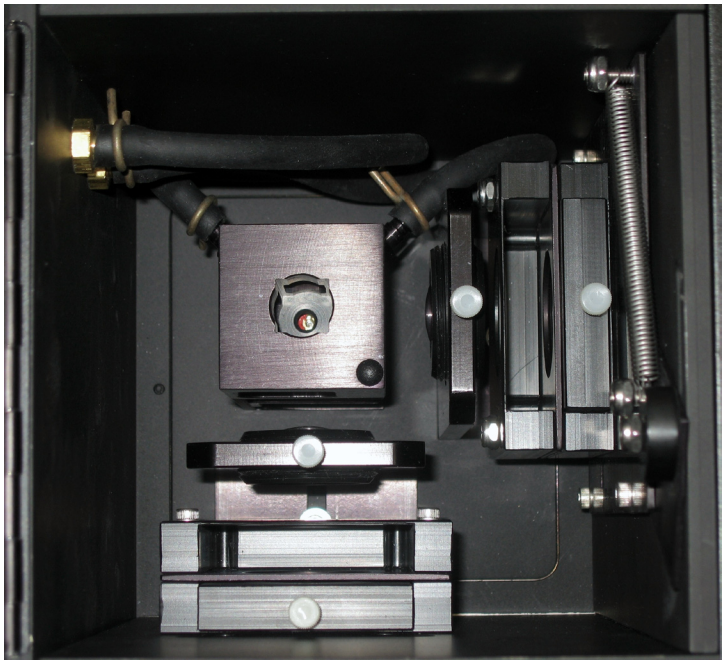
Other LED's and laser diodes are available on request.

Optional Accessories

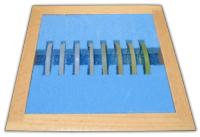
- Magnetic stirrer
- Manual sheet polarizers
- Bandpass filters
- Liquid nitrogen dewar
- Solid sample holder
- Long-pass filters
- Neutral density filters
- Microcuvette with adapter

Standard Thermostatable Sample Holder

Compact Sample Compartment



Standard Lid Actavated 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

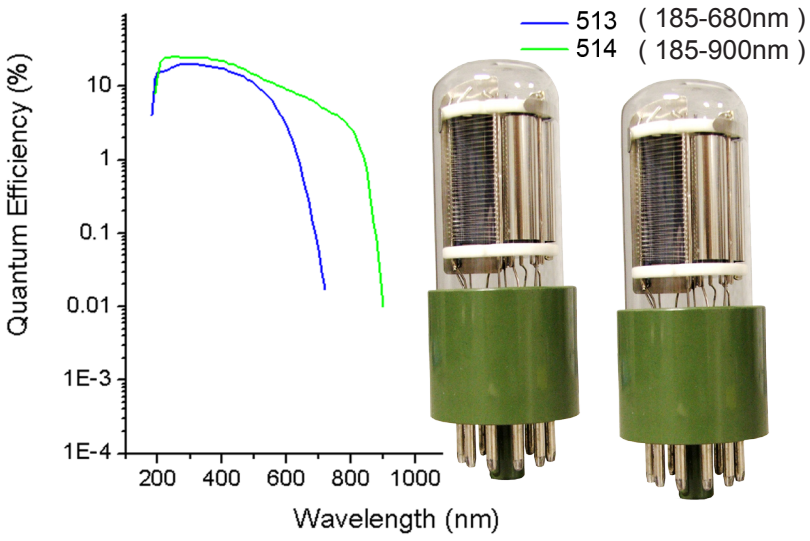
- Extended IR version

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

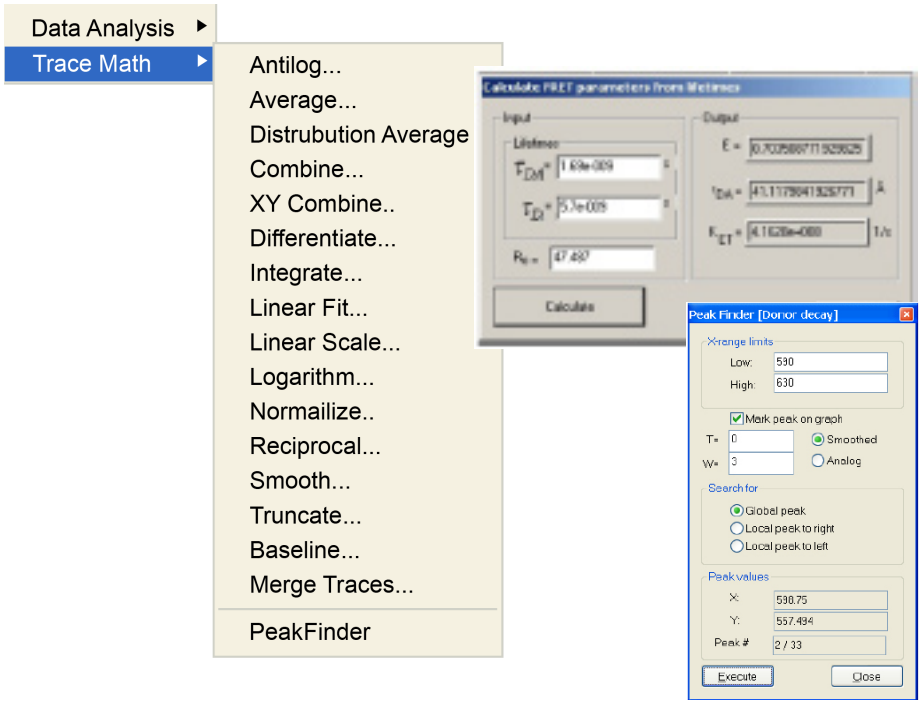
Detector Options

Quantum efficiencies of OBB pmt detectors

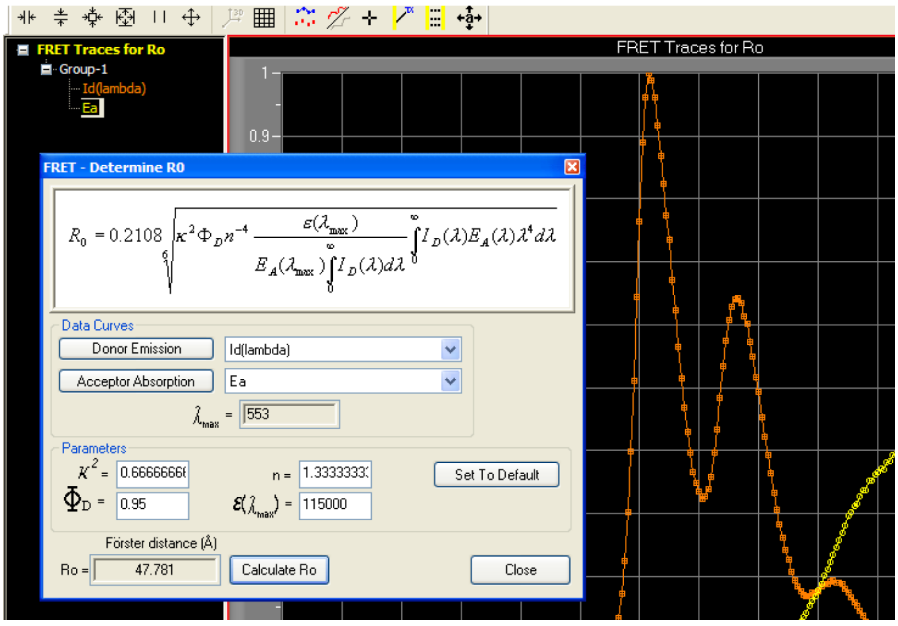


EasyLife V™

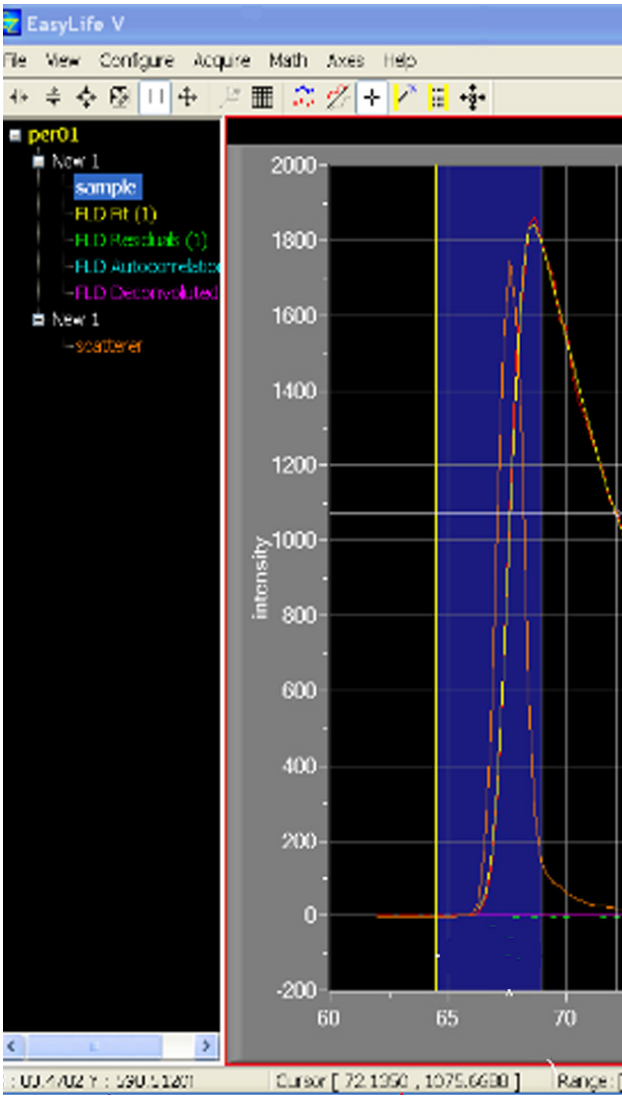
Math Features



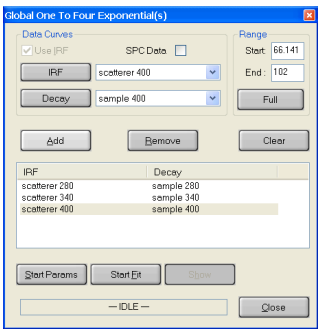
Built In FRET Calculator



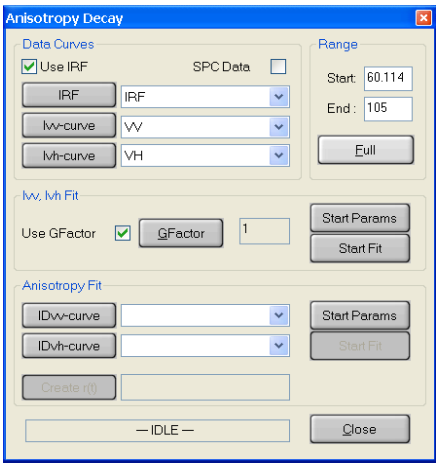
EasyLife V™ Software



Global Analysys



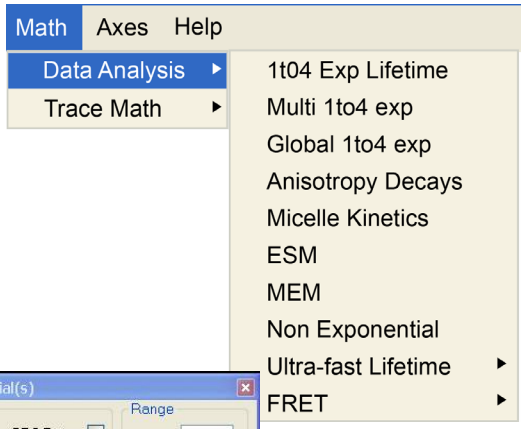
Anisotropy

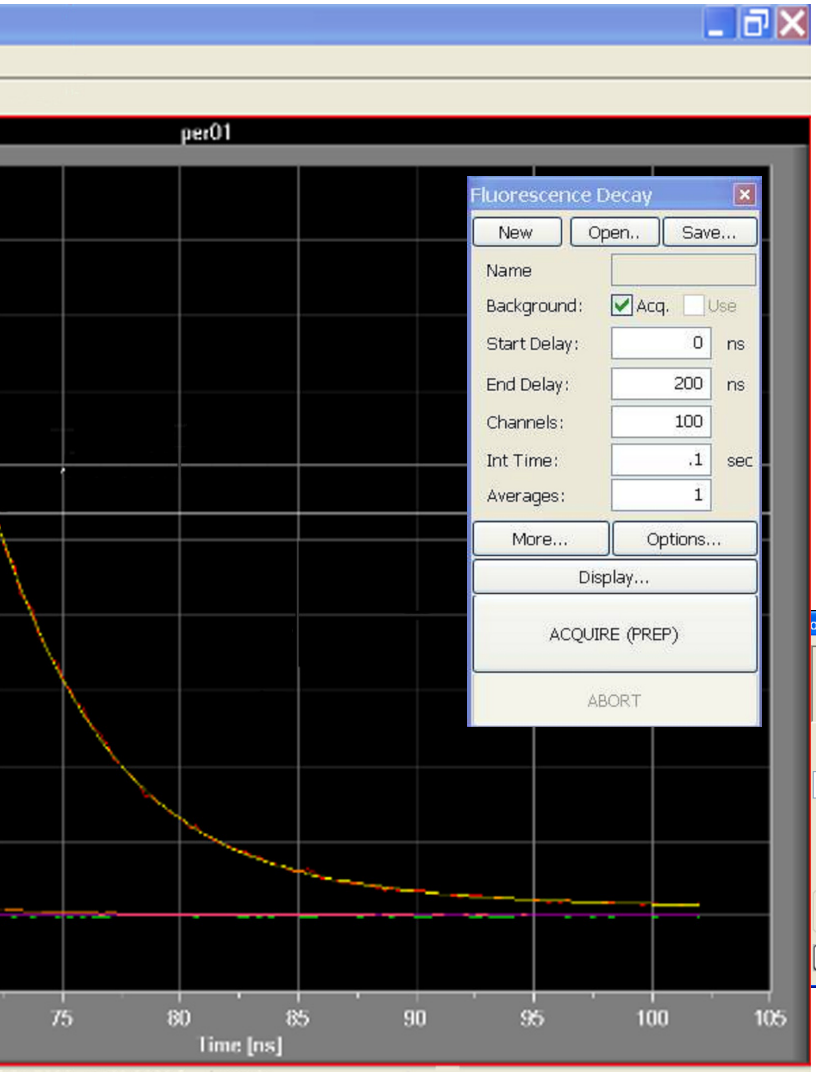


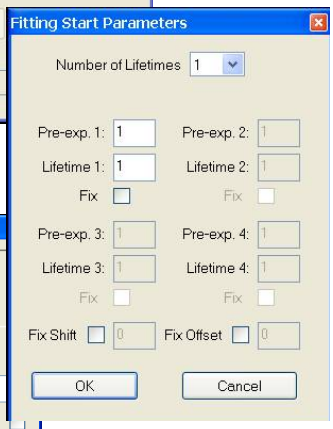
EasyLife V™

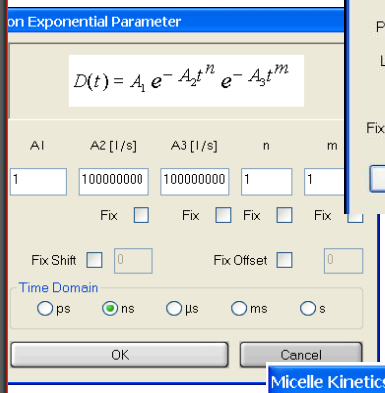
Data Analysis

designed for ease of Use

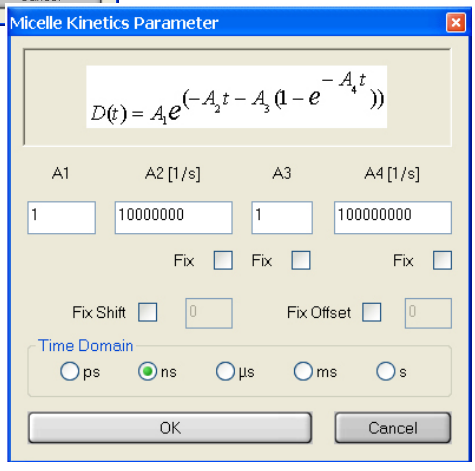


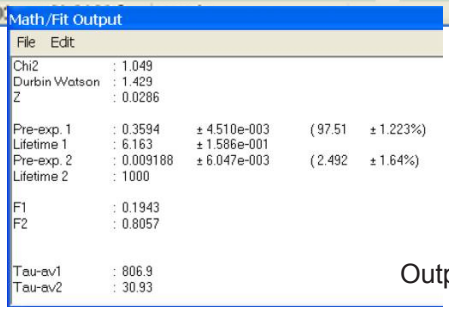




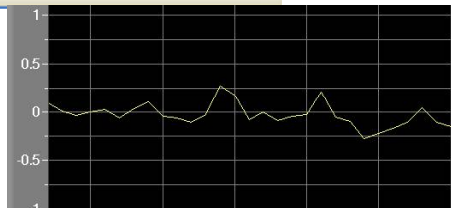


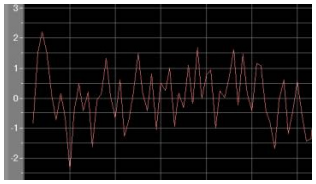
Micelle Kinetics





Output





Chi2
Random Residuals

And so much more.....

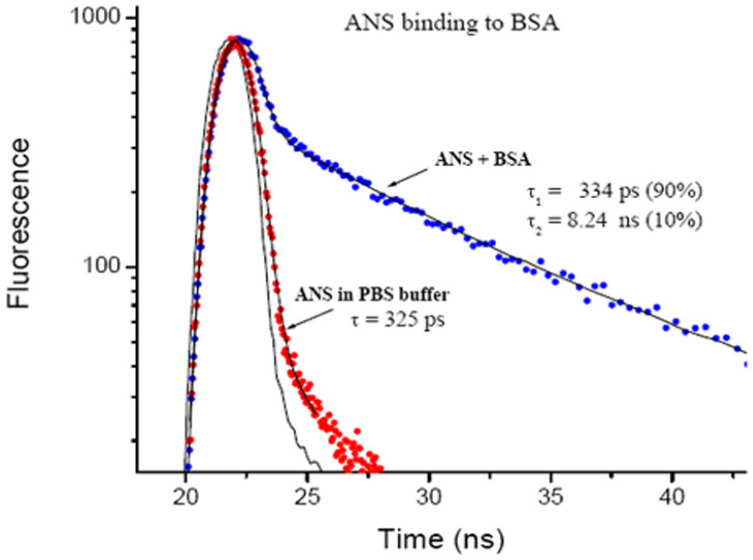
EasyLife V™

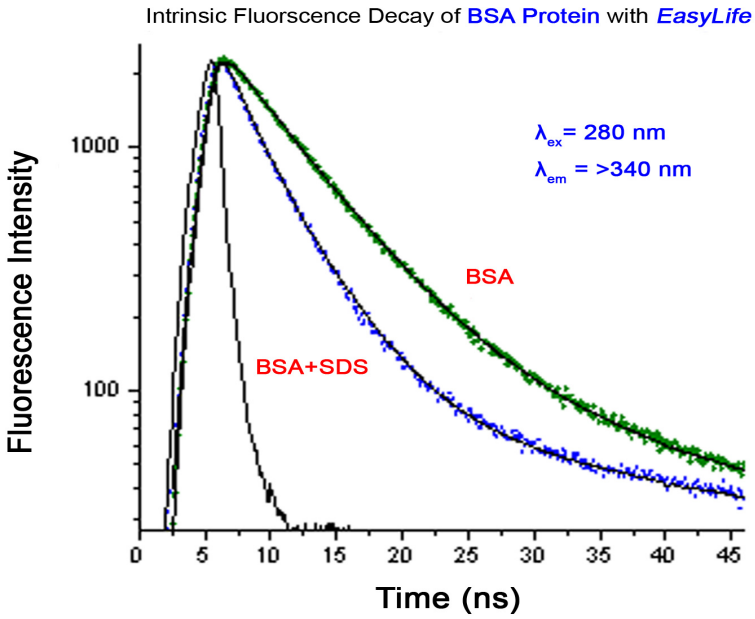
Applications

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 V™, 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 V™ 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.





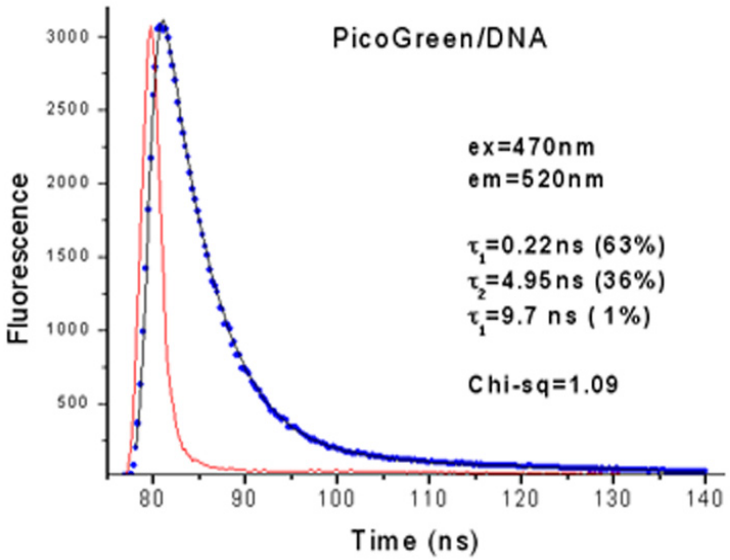
Fluorescence decays of bovine serum albumin (BSA) in PBS buffer were measured with the EasyLife V™. The native protein shows a nearly single-exponential decay with an average lifetime of 6.31 ns. After being treated with SDS detergent, BSA undergoes a structural transition and its fluorescence decay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

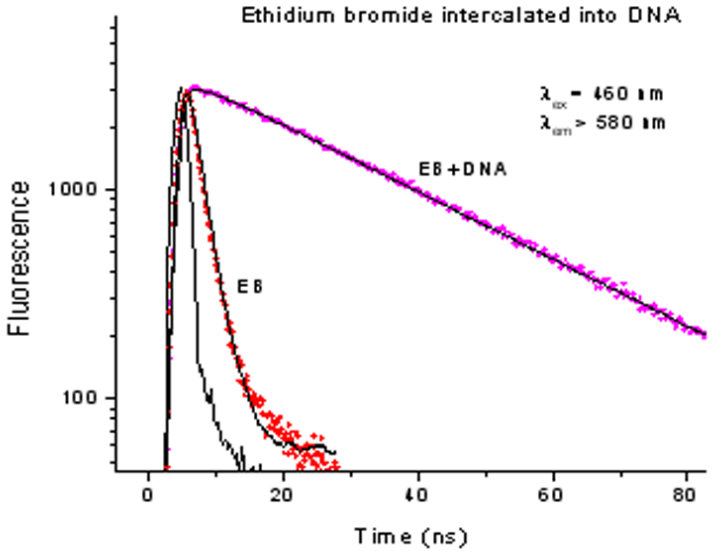
Applications

Nucleic Acids

If you study conformational features or hybridization of DNA, the EasyLife V™ 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 V™ lifetime system. Conformational diversity may result in multiple lifetimes of the probe bound to DNA. The EasyLife V™ 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.

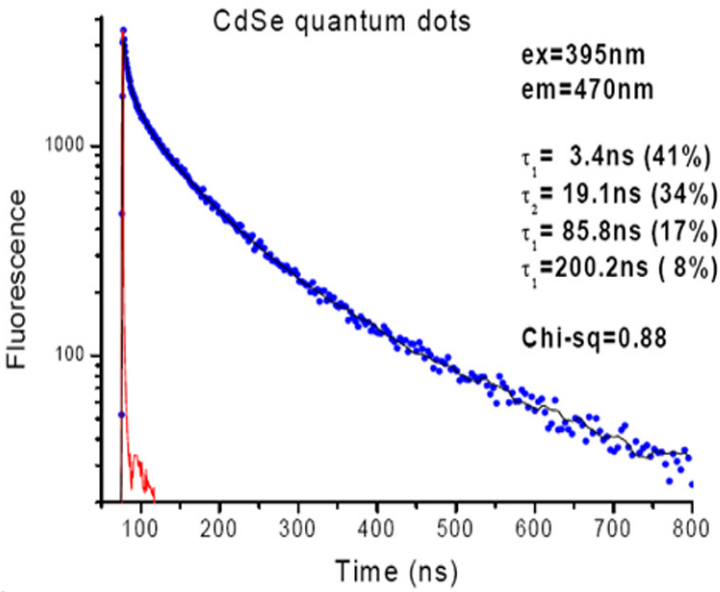
EasyLife V™

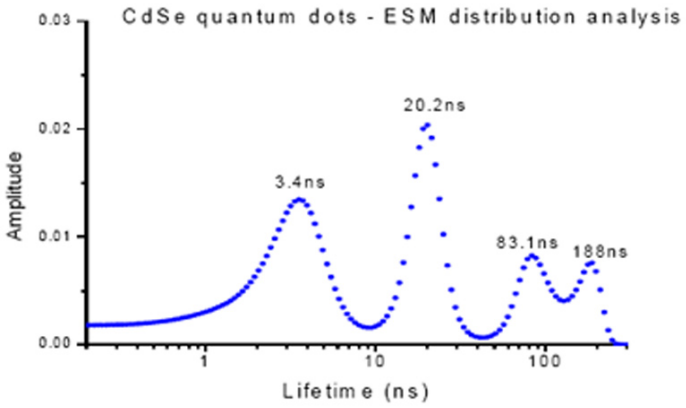
Applications

Quantum Dots

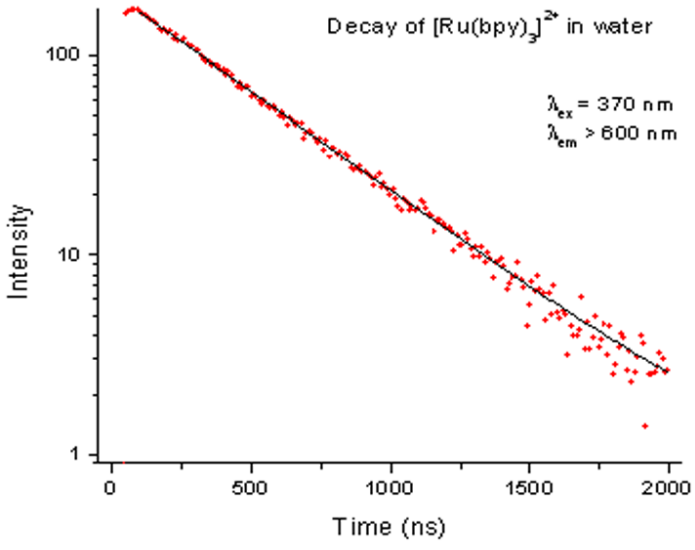
Nanotechnology has become one of the fastest growing disciplines. Quantum dots, semiconductor crystals on the nanometer scale, have become a new type of fluorescent probe, often replacing more troublesome and photo-unstable organic fluorophores. Optical properties of quantum dots, such as absorption, emission spectra, and lifetimes are determined by their size and shape.

The fluorescence decay of CdSe quantum dots measured with the EasyLife V™ indicates a highly heterogeneous nature of the sample. A unique feature of the EasyLife V™, the ability to acquire data using logarithmic or arithmetic progression timescales, facilitates greatly in analysis of multi-exponential decays with an underlying broad range of lifetimes. Here, a 4-exponential decay function was needed to adequately describe the experimental decay, acquired with the arithmetic timescale. This result was validated by the ESM lifetime distribution analysis, another powerful analytical tool in the EasyLife V™ software, which confirmed the lifetime values from the discrete 4-exponential analysis.





Metal-ligand complexes (MLC) have become very popular probes due to their relatively long lifetimes. They are particularly suitable to studying large macromolecular systems such as nucleic acids and proteins. The figure shows a decay of one of the most common types of LC, tris(2,2'-bipyridyl) ruthenium (V). The probe has a rather low quantum yield (about 4%). Not a problem for the EasyLife V™! The recovered lifetime is 429 ns.

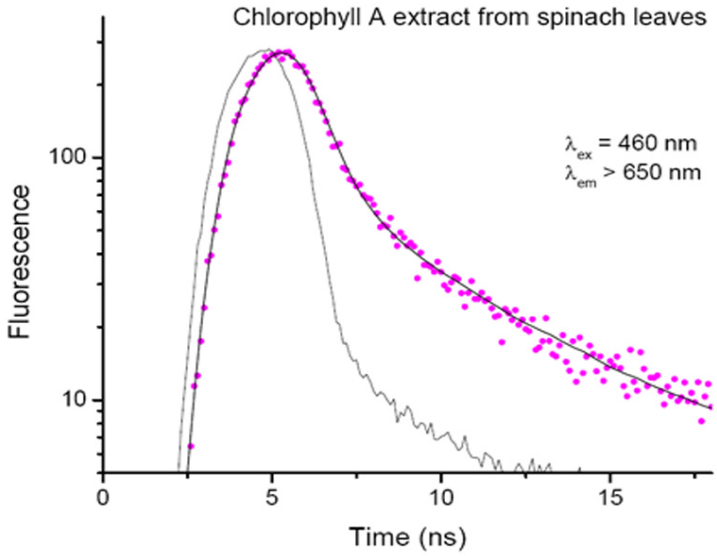


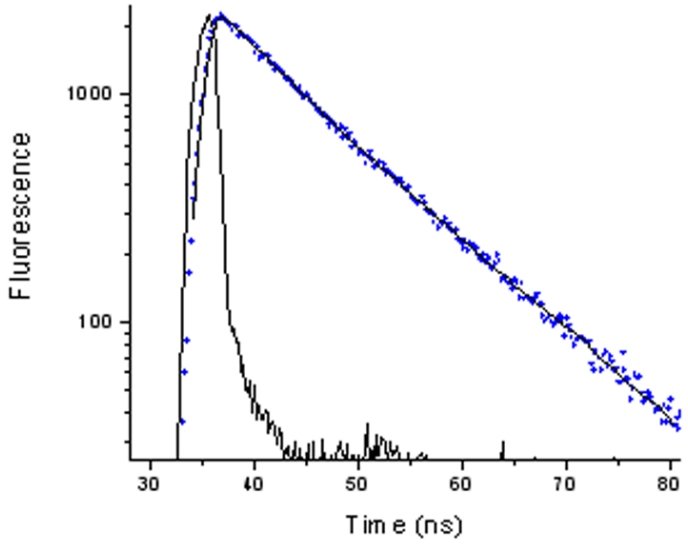
Applications

Porphyrins and Chlorophylls

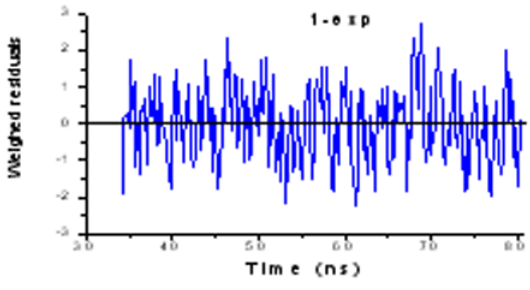
Porphyrins and chlorophylls, compounds of great biological significance, emit fluorescence that requires NIR sensitivity. Not a problem for the EasyLife V™, when equipped with the optional red-enhanced detector. Decays of both porphyrins and chlorophylls can be easily measured under a variety of conditions. This makes the EasyLife V™ a valuable tool for researchers studying primary processes in photosynthesis and for validation of photochemical and photophysical properties of porphyrin-based photosensitizers for photodynamic therapy.

Fluorescence decay of Chl A extracted from spinach leaves and suspended in buffer. The decay is double exponential due to the presence of Chl A aggregates. The recovered lifetimes are 570 ps (93%) and 4.2 ns (7%).





Fluorescence decay of meso-tetraphenylporphyrin (m-TPP) in chloroform measured with the EasyLife V™ equipped with a 370 nm LED source. Fitted with a single exponential function, the recovered lifetime is 9.16 ns. The chi-square value of 1.07 and the random residual function indicate that the single exponential model adequately describes the decay of m-TPP.

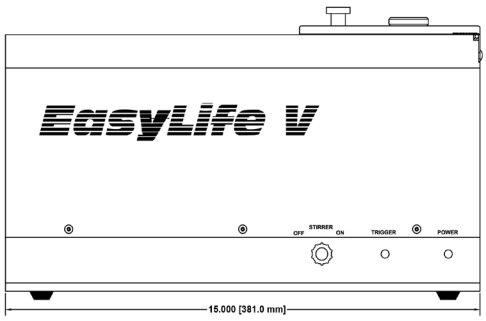


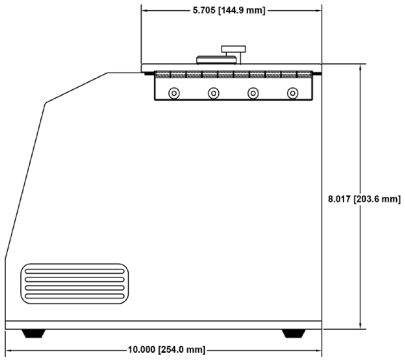
EasyLife V™

Specifications

- **Lifetime range:** 100 ps to 3 µs
- **Sensitivity:** 400 picomolar fluorescein
- **Excitation:** OBB proprietary nanosecond LEDs
- **Optical pulse width:** 1.5 ns (typical)
- **Excitation range available:** 280–670 nm (LED dependent)
- **Emission range:** 200–650 nm (optional to 900 nm)
- **Wavelength selection:** 2” square or 1” round filters
- **Detection:** OBB patented lifetime detector
- **Typical acquisition time:** 20 s (sample dependent)
- **Timescale (menu selectable):** Linear, arithmetic and logarithmics
- **Acquisition mode:** Fluorescence Decay or Lifetime Kinetics
- **Sample holder:** Single 1 x 1 cm cuvette (micro-cuvettes available)
- **Software:** EasyLife™ V
- **Lifetime analysis:** Complete package: 1-4 exponential, global, non-exponential, micelle kinetics, lifetime distribution (ESM and MEM), anisotropy, FRET calculator
- **QuickStart DVD:** Included

* All specifications subject to change without notice





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