

Time-Resolved Fluorescence Spectrometer (TRFLS)

FLUORESCENCE UPCONVERSION WITH TIME-CORRELATED SINGLE PHOTON COUNTING OPTION



Applications

- Ultrafast dynamics of chemical reactions, excited state dynamics
- Conformation dynamics and kinetics in fluorescent molecules
- Quantum dots characterization
- Bioorganic photosynthetic system analysis
- Dynamics in fluorescent proteins and DNA constituents
- Carrier dynamics in nanocrystals and nanoparticles
- Proton transfer
- Dye/label photophysics

Newport's Time-Resolved Fluorescence Spectrometer (TRFLS) offers versatile functionality for researchers gathering fluorescence kinetic traces. The standard fluorescence upconversion platform can be coupled with an ultrafast oscillator, amplifier, SHG/THG, OPA/OPO, while the optional time-correlated single photon counting setup can be added to systems pumped by fs oscillators.

In fluorescent upconversion, the fluorescent sample is pumped by a femtosecond pulse and the fluorescence is upconverted using an optically gated pulse to generate sum frequency radiation. The upconverted light is then spectrally resolved via monochromator or spectrograph using a PMT. The software automatically controls the upconversion crystal's phase matching angle and monochromator grating angle throughout the fluorescent wavelength range of interest. The software also controls the delay line and gathers time-resolved information which is displayed in a 3D color plot. Calibrated GVD and photometric corrections of spectra are also automated in the software. Compared to pump-probe spectroscopy techniques such as transient absorption, the data interpretation of fluorescence upconversion is straightforward as only emission is measured. Fluorescence upconversion offers fs resolution dynamics information out to 3.3 ns time scale ranges for UV-VIS-IR wavelength ranges.

For researchers interested in studying time dynamics out to μ s time range, time-correlated single photon counting can be added primarily as an option for systems being pumped by femto or picosecond oscillators. TCSPC covers the UV-VIS wavelength ranges with high resolution. The TCSPC method is highly sensitive, so this will work well even for weak signals.

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Specifications

Fluorescence Upconversion

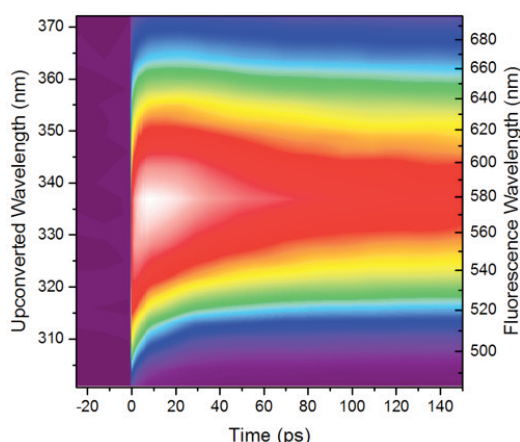
| | |
|------------------------------|------------------------------------|
| Luminescence Spectral Range | 400 - 1600 nm available |
| Spectral Resolution | 150 cm ⁻¹ |
| Time Range | 3.3 ns |
| Minimum Step Size | 13.4 fs |
| Repetition Rate - Amplifier | 1 - 100 kHz |
| Repetition Rate - Oscillator | 70 - 100 MHz |
| Time Resolution | 100 - 400 fs, typical |
| Computer Requirements | Laptop with USB port, Windows 7 OS |

Time-Correlated Single Photon Counting

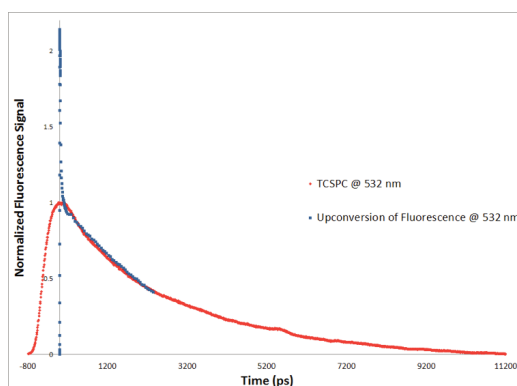
| | |
|------------------------------|---|
| Luminescence Spectral Range | 230 - 700 nm, standard |
| Spectral Resolution | < 1 nm |
| Time Range | 3.3 ns - 2 μ s |
| Step Size Range | 813 fs - 31.25 ns |
| Repetition Rate - Oscillator | 70 - 100 MHz |
| Time Resolution | < 200 ps |
| Computer Requirements | Desktop with PCI slot, USB port, Windows 7 OS |

Physical Dimensions

| | |
|-------------------------|--|
| Length x Width x Height | 975 x 675 x 225 mm (38.5 x 26.75 x 9 inch) |
| Input Beam Height | 160 mm (6.3 inch) |



Fluorescence upconversion dynamics of Coumarin 153 in MeOH.
(Courtesy Newport Technology & Applications Center)



Comparison of Fluorescence Upconversion to TCSPC for C153 in MeOH.
(Fluorescence upconversion captures early dynamics while TCSPC captures extended time scale dynamics.)



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all been certified compliant with ISO 9001 by the British Standards Institution.

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