

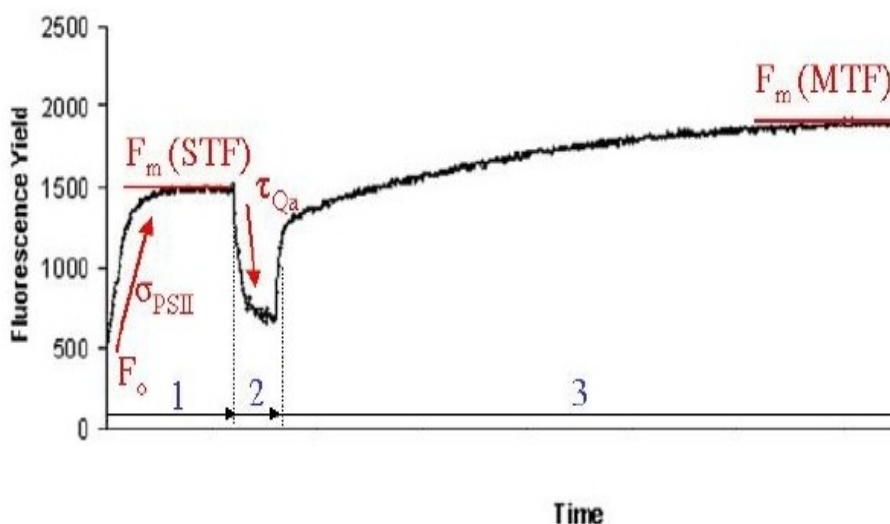
FLUORESCENCE INDUCTION AND RELAXATION (FIRE)



The Satlantic FIRE (**F**luorescence **I**nduction and **R**elaxation) System is the latest advance in bio-optical technology to measure variable fluorescence in photosynthetic organisms. Developed in collaboration with Dr. Maxim Gorbunov and Dr. Paul Falkowski from Rutgers University, the system is the result of 15 years of experience and development in photosynthesis and oceanographic instrumentation.

The FIRE technique is based on active stimulation and highly resolved detection of the induction and subsequent relaxation of chlorophyll fluorescence yields on micro- and millisecond time scales. This approach provides:

- minimum and maximum fluorescence yields in the dark and under actinic lighting (**F_o**, **F_m**, **F_{o'}**, and **F_{m'}**);
- the maximum quantum efficiency of photochemistry in PSII in the dark (**F_v/F_m**) and the effective quantum efficiency under actinic light (**F_v'/F_{m'}**);
- quantum yield of photochemistry in PSII measured under actinic light (**ΔF'/F_{m'}**, or **Φ_{PSII}**)
- coefficients of photochemical and non-photochemical quenching (**qP** and **qN**);
- the functional absorption cross-section of PSII (**σ_{PSII}**);
- and rates of electron transport on the acceptor and donor sides of PSII (**τ_{Qa}** and **τ_{PQ}**).



Fluorescence Induction and Relaxation Profile
as measured with the FIRE

Typical Applications:

- Ecophysiological Studies
- Quantify environmental stress responses
- Phenotype characterization
- Assess primary productivity in aquatic ecosystems



FIRe Actinic Light Source (ALS) Accessory

The optional **Actinic Light Source (ALS)** is used to illuminate the FIRe sample cuvette for light adapted chlorophyll fluorescence analyses.

This provides users the ability to do automated light response curves of chlorophyll fluorescence and quenching parameters using a uniform, fully characterized source.



FIRe Fiber Optic Probe Accessory

The new **FIRe Fiber Optic Probe** accessory facilitates chlorophyll fluorescence measurements on macrophytes and leaves of higher plants.

It also allows users the flexibility to interface their FIRe with specialized cuvettes (e.g. O₂ electrodes) for expanded physiological analysis of phytoplankton samples.

SYSTEM FEATURES

- Complete and ready for use with computer, monitor, keyboard and USB drive
- Dedicated software package for real time data analysis
- User-friendly and flexible protocols for measurements and data analysis
- Optional Ambient Light Source (ALS) for light adapted analyses
- Optional fiber optic probe for measurements on higher plants, macrophytes and multichannel analyses on phytoplankton.
- Wide dynamic range of fluorescence signals (four orders of magnitude)
- Comprehensive suite of fluorescence and photosynthetic parameters
- Extremely sensitive

SPECIFICATIONS

- Excitation light sources: blue LED (maximum emission 455 nm, 60 nm bandwidth), green LED (maximum emission 540 nm, 60 nm bandwidth). Optional wavelengths available.
- Emission detection: 680 nm and 880 nm
- Detector: Auto gain ranging, high sensitivity
- Chlorophyll Sensitivity: 0.05-100 mg/m³
- Pulse control: Programmable 1 msec – 50 msec
- Optional Ambient Light Source: 0 –2000 $\mu\text{mol photons}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$
- Data acquisition: 14bit 1MHz
- Operating Platform: Pentium-based PC
- Power Supply: 85-250 VAC, 43-63 Hz
- Operating Temperature: 0°C to + 40°C
- Dimensions: 45 x 14 x 49 cm; 17.5 x 5 x 19 inches