BioLogic
Science Instruments

JTS-100

Joliot Type spectrometer

...See the light,
not the scatter

For studying reaction kinetics in:

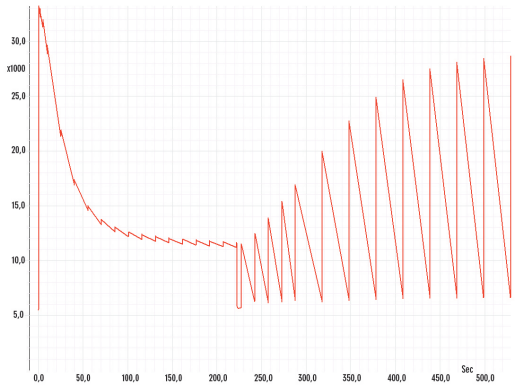
- Photosynthetic electron transfer
- Artificial photosynthesis
- NPQ, P700, Plastocyanin, Cytochrome b6f, OJIP
- Abs/Fluo studies of photo-initiated reactions

The JTS-100 is a Joliot type pump-probe spectrometer. It is designed for looking at photo-initiated reaction kinetics on a micro-second time scale. It can be used in fluorescence or absorbance modes with a range of excitation and detection wavelengths to examine electron transfers and non-photochemical quenching in leaves, algae, or bacteria. Applications for artificial photosynthesis and photo-voltaic development can be quickly developed.

The system has three components: an optical bench, large area photodiodes and a hardware controller. The dual beam configuration of the optical bench and low-noise electronics deliver extreme stability and excellent reproducibility. The hardware controller has pulsed current sources and programmable voltage supplies, which make integration of new LEDs fast and easy. The controller contains high speed processing electronics to control events or read data with 100 ns precision. It also contains a single board computer which hosts the platform-independent web app interface.

Designed for easy user adaptability!

Open optical bench
Open source user interface
Web application control software
LED modules are easy to adapt



A typical Non-photochemical quenching (NPQ) experiment on the JTS-100

The JTS-100 optical bench is inspired from the original JTS-10 design. LED based actinic sources are either built-in or external modules. It can also be used with a laser or a photo-flash excitation source. Large area photodiodes provide reference and signal to offer ultimate signal to noise, i.e. very small absorbance changes can be measured in strongly scattering samples.

The interchangeable sample holders are specially designed to allow temperature to be controlled by a thermostated bath.
By introducing a continuous flow of gas (N2,CO2...), it is possible to control the chamber's atmosphere. Holders for leaves and suspensions are available but JTS-100 can also accommodate new sample types.

Photo-Kine SOFTWARE

The JTS-100 is controlled through a web application. This interface eliminates nearly all dependence on PC type or operating system. It has been demonstrated on Windows, Mac, Linux, and tablet devices. All data and experiment parameters are stored in a standard SQLite database. An export tool is included for easy selection of data with customizable header fields and sample data columns. Data can be exported as CSV or to native Excel. When exported to Excel it will automatically open in Excel on most systems.

Features

- Data collection to micro-second rates
- Adaptable LED modules
- Light intensities up to 2000 µE
- Can be used with multiple sample types
- Open source web application user interface
- Control through common web browser
- Use with Windows, Mac, Linux, or tablet
- Data storage is SQLite
- Export tool for quick selection of data

JTS-100 main display. Multiple data sets can be selected. Multiple analysis operations are a click away.

Experiments are simple to write. Select an action: Detection, Actinic Light (on, off, or intensity change), and Time Parameters. Loops and exponential timing are also included.

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Sequence   20(500msD)10usK[80000]T10us{10us,100,5s
           ,D}L[80000]10us{10us,150,10s,D}
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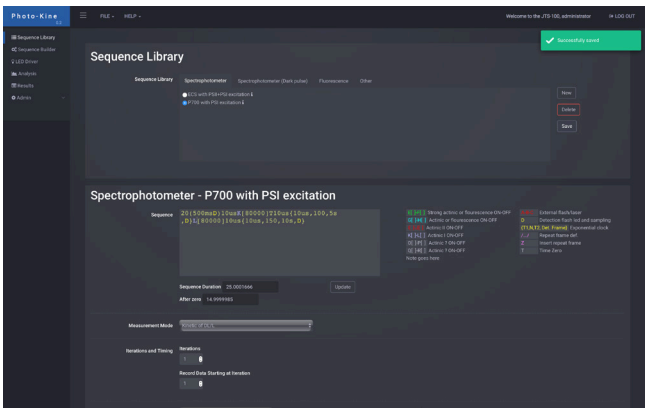

Run controls and data processing selections

The user interface and Photo-Kine control software was developed with customer access in mind. Source software and tools are all open source. Combined with the open design of the optical and LED modules, users can develop a new application for the JTS-100 within an hour or two.

DETECTION KITS

P700+ at 705 and 810
OJIP, NPQ
Cytochromes b & f
Linear vs. Cyclic Electron Flow
Electrochromic Shift
Fluorescence Induction

Bio-Logic offers a range of kits to match the most popular applications in the study of photosynthetic electron transfer reactions. These kits include detection LED and appropriate interference filters which were carefully chosen to offer state of the art measurements.

JTS-100 is modular and not dedicated solely to photosynthesis applications. Users can create their own kit to match their application (caged compound) and can thus add new LEDs, new sample holders, and new filters.

Already have a JTS-10 ?

The existing JTS-10 optical bench is compatible with the new JTS-100 controller. Thus, a JTS-10 system can be upgraded completely or partially:
- A full upgrade consists of replacing the controller and detectors, which allows users to benefit from all JTS-100 features and the new Photo-Kine software.
- A partial upgrade consists of exchanging either the controller or the detectors. A controller upgrade provides the user with a modern user interface and significant data processing improvements. The detector upgrade reduces detector recovery time by a factor of 10 when using high intensity actinic sources.

SPECIFICATIONS

Probing light	White pulsed LED: Flash duration 2-10 µs
Interference filter	520 nm (FWHM: 10 nm)
Actinic LED	Dual ring 630/720 nm LED
	Light intensity range : 0 - 2000 µE
Detection	2 detectors (preamp modules with large hight speed diodes)
	Photodiode and 4 step preamp gain control
Data acquisition	ADC 18-bit resolution
PC interface	Ethernet or USB
Dimensions	48 x 38 x 12 cm each for optical bench and controller
External device control	DB9 auxiliary port and two programmable BNCs as inputs of outputs of TTL pulses
LED control	Minimum LED pulse duration: 2 µs
System controlled	12 V DC; 0 - 5 A DC
	System event timing resolution: 100 ns

Optional Kits	
Cytochrome eukaryote	Interference bandpass filters centered at 546, 554, 563, 573 nm (FWHM: 6 nm)
P700 at 705/740 nm	Combined detection LED at 705 and 740 nm and associated interference filters at 705 and 740 nm (FWHM: 6 nm and 10 nm respectively)
P700 at 810/870 nm	Detection LED at 810 and 870 nm with appropriate cut-off filters
Bacteria	Absorbance: Actinic LED 880 nm and interference bandpass filters at 525 nm (FWHM: 6 nm) for the detection of carotenoid bandshift

User must supply PC with web browser (Safari, Firefox, Chrome) and Ethernet or USB connection. System OS is not critical.

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