

chronosDFD

Chronos DFD - ISS Digital Frequency Domain technology for Lifetime measurements in complex decays in less than 1 second.

ChronosDFD is capable of measuring decay times of fluorescence and rotational correlation times of complex fluorescence mixtures in 1 second with an accuracy of a few picoseconds. The novel instrument opens a number of applications until now hindered by the duration of the acquisition: the capability of measuring fluorescence decay in a short time makes the instrument usable for measuring fast kinetics processes; the decay times of mixtures in a stopped flow apparatus and in chromatography; and lifetimes in samples where the exposure to light has to be minimized in order to avoid photobleaching.

How does it work?

The ChronosDFD uses the unique digital frequency domain technology. The light sources (laser diodes and LEDs) are modulated using square pulses of about 2 nanosecond duration with a repetition rate selected by the user and in the range from 0,05 Hz. to 80 MHz. The frequency signal contains the fundamental frequency at the repetition rate and its harmonics for up to thirty; that is, when the fundamental frequency is, for instance 10 MHz, harmonics at 20,30,40 and all the way up to 300 MHz are generated. The detector photons are separated into phase bins depending upon their individual phase shift and demodulation until a phase histogram is built; from the the histogram the decay times are determined.

Designed for Steady-State & Time -Resolved Applications

Steady-State Measurements

- Intensity measurements at fixed wavelengths
- Polarization (anisotropy) measurements at fixed wavelengths
- Slow and fast kinetics
- Dual wavelength emission-ratiometric measurements

Time-Resolved Measurements

- Frequency responses of single and multi exponential decays
- Anisotropy decays
- Phase and modulation resolved kinetics
- Phase and modulation resolved spectra
- Time resolved spectra
- FRET



User friendly Software

ChronosDFD includes *Vinci- Multidimensional Fluorescence Spectroscopy*, a powerful software package that provides several ready-to-use routines for reliable, user friendly acquisition of complex fluorescence data:

- Spectra (excitation, emission, synchronous, time-resolved and polarization)
- Measurements at fixed wavelengths (intensity and polarization)
- Measurements of kinetics
- Time-resolved measurements (lifetimes and rotational correlation times)

Key Features

- Flexible instrument configuration with a variety of light sources (laser diodes, LEDs, Supercontinuum laser and Ti Sapphire laser)
- Second to picosecond lifetime measurement capabilities using the same hardware
- Complete lifetime scans in one second on routine samples with proprietary Digital Frequency domain technology
- A compact footprint and short optical pathlength for maximum sensitivity and efficient light coupling into the sample
- T-format and parallel beam optical design for fast and precise polarization measurements
- Full automation of instrument components including: cuvette holder, polarizers, shutters, filter wheel, monochromators and stirrers
- PC-controlled integration of temperature bath, titrator, stopped-flow apparatus & pressure pump
- User selectable data acquisition display: time-domain or frequency-domain

Vinci, the Complete Software Solution for Steady-State and Time-Resolved Applications

A powerful and flexible multidimensional fluorescence spectroscopy software with ready-to-use routines for data acquisition and analysis.

Software Specifications

Instrument Automation

ChronosDFD is the instrument of choice for reliable time-resolved data acquisition using laser diodes and LEDs. All hardware components, including external devices, are automated and PC-controlled.

Instrument Diagnostic and Noise Detection

Vinci includes routines for analyzing the instrument's performance, allowing the user to monitor data acquisition and noise level during the entire measurement. If sample saturation occurs the signal level is adjusted accordingly.

User-friendly Acquisition

A sequence of measurements is acquired through a one-time setup of the experiment file, allowing for the automatic acquisition of multiple data sets.

Personalized Log-on

With its unique system memory design, Vinci allows user-specific access. In multi-user environments each user may perform measurements with a personalized instrument configuration.

Data Analysis

Decay Times

Decay time analysis is performed on multiple data sets using various models including multi-exponential, non-exponential and lifetime distributions.

Rotational Correlation Times

Anisotropy decay data analysis of up to three species using models for isotropic, anisotropic and hindered rotators.

Phase- and Modulation-Resolved Spectra

Vinci also includes routines for the separation of up to three components in phase- and modulation-resolved spectra.

Phasor (polar) plot analysis

A powerful graphical approach to fluorescence decay data analysis used to quantify individual components of a mixture, FRET processes and excited states reactions.

Data Display & Export

- 2D and 3D display with user-defined colors and fonts
- 3D surface rotation and in/out zooming
- 3D display of user-defined functions
- Cursor identification of XY spectra coordinates
- Time-resolved spectra display as 3D and center of gravity plots
- Export to gif, png, jpeg, bitmap and metafile formats
- Data are generated and exported in ASCII format

Instrument Specifications

Light Sources (Internally modulated or pulsed):

Laser diodes: 370, 405, 436, 473, 635, 690, 780 and 830 nm

LEDs: (265, 280, 300, 335, 355, 370, 460, 480, 500 and 520 nm)

Optional: Xenon Arc Lamp, Continuous-wave (CW), Super continuum laser and Ti:Sapphire laser

Focusing & Collection Geometry: Parallel beam design for precise polarization measurements

Polarizers: UV grade Glan-Thompson with L/A=2.0

Light Detectors: PMT, hybrid PMT, MCP, APD

Wavelength Range: From 200 nm to 1700 nm (detector-dependent)

Max Counts Range: Up to 13 million counts/s (hybrid detectors)

Lifetime Measurements Range: 10^{-12} to 10^{-2} sec

OS Requirements: Windows 10

Power Requirements: Universal power input of 110-240 V, 50/60 Hz, 400 VAC

Dimensions: 540 mm (L) x 400 mm (W) x 330 mm (H)

Weight: 26 kg

Information & specifications are subject to change without notice.

For more information and a complete list of accessories for ChronosDFD, please visit www.iss.com

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