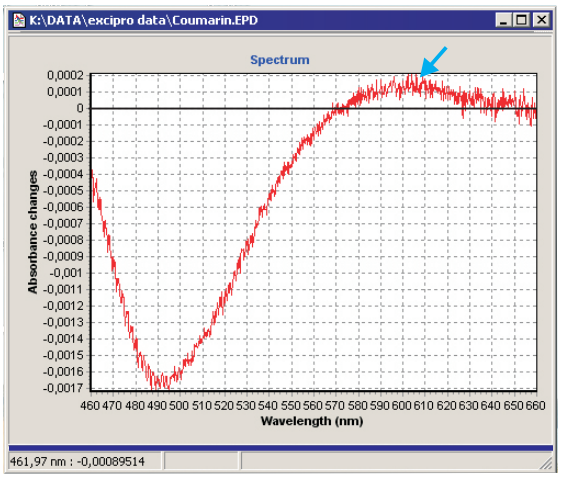
Hatteras

Femtosecond Pump-Probe Transient Absorption System

Hatteras is the first on the market professional system for ultrafast transient absorption pump-probe spectroscopy. Two linear image sensors are placed in the focal plane of an imaging spectrometer to measure probe and reference spectra, originating from a femtosecond white light continuum generator. The reference channel is always used in transient absorption measurements to get optical density changes (OD with best signal-to-noise ratio.

The optical delay between pump and probe pulses is scanned with a computer controlled delay line, and OD (,t) spectra are recorded with the Hatteras data acquisition software.



Transient absorption spectrum measured in Coumarin 30 dye solution with the multichannel detection at 460 nm - 660 nm. Blue arrow shows a peak of **0.13 ± 0.01 mOD** at 660 nm and demonstrates the Hatteras excellent sensitivity.

Key Features

- Professional pump-probe system with probe and reference channels
- Multichannel and single-channel OD detection
- Computer controlled imaging spectrometer with four-grating turret
- NMOS linear image sensors for multichannel detection with best S/N ratio
- OD detection in solutions, thin films, vapor cells and solid samples
- Optimized configuration for best temporal resolution
- 0.1 mOD sensitivity
- Rotation sample cell for pseudo single shot excitation
- Built-in white light continuum generator
- Built-in second harmonic generator
- Chirp correction

Del Mar Ultrafast Products

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Specifications

- **White light continuum generation at 350 nm - 1600 nm**
- **1024 -pixels NMOS linear image sensors for spectra detection at 350 nm - 1000 nm**
- **256 -pixels InGaAs linear image sensors for spectra detection at 900 nm - 1600 nm**
- **Single-channel detector head for UV - IR kinetics detection at 250 nm - 2500 nm**
- **Maximum delay between excitation and probe pulses: 2.0 ns (4.0 ns in the optional double pass configuration)**
- **Minimum step of the delay line: 0.78 fs (1.56 fs in the optional double pass configuration)**
- **Input pulse repetition rate for multichannel detection: 10 Hz - 1 kHz (10 Hz - 5 kHz for single channel detection)**

Dimensions

- Hatteras optical unit: 760 mm x 600 mm x 200 mm
- CDP 2022i spectrometer: 320 mm x 200 mm x 160 mm
- Hatteras control unit: 250 mm x 250 mm x 100 mm

Input Pulse Requirements:

- Standard input pulse source: femtosecond Ti: sapphire amplifier, 1 kHz pulse rep. rate
- Required pulse duration: < 200 fs
- Required pulse energy: > 0.2 mJ

Sample Excitation:

Built-in second harmonic generator is used for the sample excitation at 380 nm - 420 nm. An external optical parametric amplifier (TOPAS is recommended) gives wavelength tunable sample excitation from UV to IR. The TOPAS wavelength is controlled by the Hatteras 2.6 software.

Probe & Reference Detection:

Visible or infrared multichannel detector head contains two NMOS linear image sensors for detection of probe and reference spectra, respectively. These image sensors are extra-deep well photodiode arrays, providing high signal-to-noise ratio, which is most important in transient absorption measurements.

Single-Channel Detection:

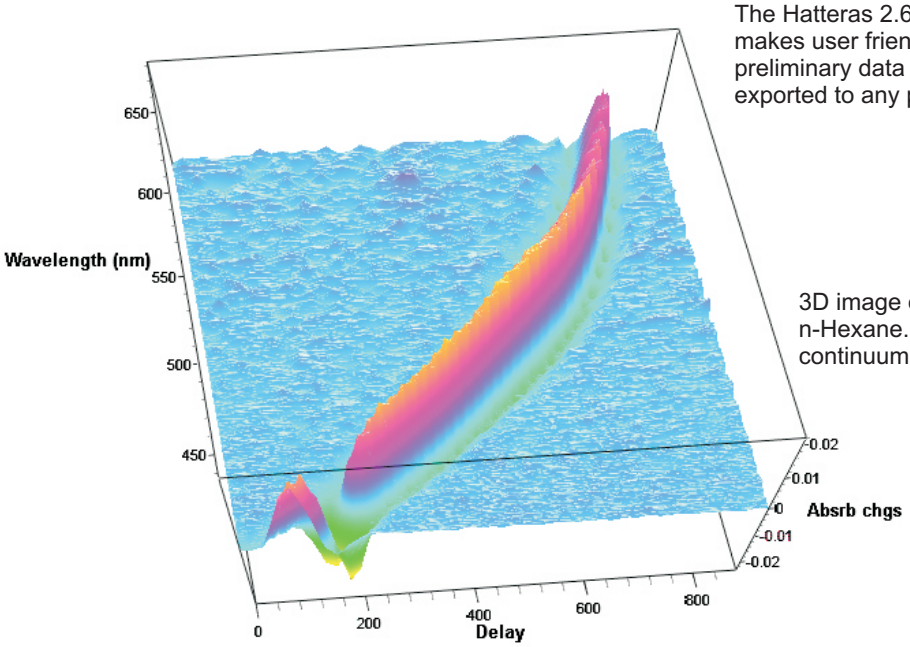
A single-channel detector head containing two photodiodes is used to detect high quality transient absorption kinetics at selected wavelengths. An external optical parametric amplifier can be used as a source of probe and reference pulses for the single channel detection.

Imaging Spectrometer:

The CDP 2022i computer controlled imaging spectrometer with 4-grating turret is equipped with two standard gratings for visible (300 nm - 1000 nm) and IR (900 nm - 1700 nm) operation. Basic gratings give 206-nm multichannel detection bandpass with tunable central wavelength. Optional gratings are installed on request. The spectrometer has two outputs for simultaneous mounting of two (multichannel or single channel) detector heads.

Software:

The Hatteras 2.6 software with 100 pages of the manual makes user friendly data acquisition, chirp correction and preliminary data analysis. Obtained data can be easily exported to any professional data analysis software.



3D image of a pump-probe response measured in n-Hexane. The response is used for femtosecond continuum chirp correction.

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