

Ultrafast Transient Absorption Spectroscopy System

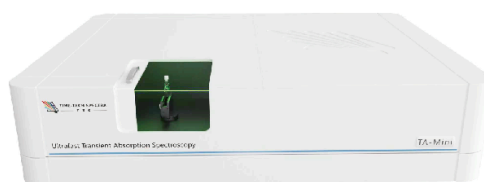
Product Overview

The TA-AUTO and TA-MINI are transient absorption spectrometers designed to probe photo-induced electronic transitions and excited-state dynamics in various materials. TA-AUTO: Covers a broad spectral range from ultraviolet (UV) through visible and near-infrared (NIR) to mid-infrared (MIR). TA-MINI: Covers a broad spectral range from ultraviolet (UV) through visible. Supports time resolutions ranging from femtoseconds to microseconds. These systems can be integrated with a microscopy module to achieve high-spatial-resolution transient absorption spectroscopy.

Additionally, these systems can incorporate a high-speed CMOS area camera to enable spatial defect mapping and the characterization of carrier diffusion and mobility. For high-repetition-rate laser sources, they can be further expanded with high-speed detectors to enhance detection sensitivity, achieving a detection limit as low as $\leq 10^{-5}$ OD.



TA-AUTO



TA-MINI

Specifications

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Main

Laser type	TA-AUTO	TA-MINI
Spectral range	380–650 nm	380–650 nm
(1030 nm laser based)	480–950 nm	480–950 nm (Default)
	1100–1650 nm	–
Mode	Transmission/reflection/back-side pump	
Time window	8 ns	
Sensitivity	0.1 mOD, up to 0.02 mOD	
Sample holder	Solution, film, and powder	
Software	Data acquisition, analysis and fitting	
IRF	≤1.5x Pulse width	
Automation system	Automated switching of spectral ranges Automated pump beam alignment Automated optical delay line alignment	Not Available

Time-Resolved Micro-Imaging Module

Mode	Micro spectroscopy acquisition/wide-field TA imaging/Carrier diffusion imaging
Spatial resolution	≤1 μm
Wavelength range	400-800 nm
Carrier migration accuracy	100 nm

Nanosecond TA Upgrade Module

Mode	Switchable transmission/reflection	
Spectral Detection Range	380–1700 nm	
Time window	$\leq 400 \mu\text{s}$	
Time Resolution	1 ns	
Maximum Detection Sensitivity	$\leq 0.1 \text{ mOD}$	
NS-SC Laser	Spectral range	350–1800 nm
	Pulse Width	$\sim 800 \text{ ps}$
	Repetition Rate	2 KHz
	Power Stability	$\pm 1 \%$
	Total Average Optical Power	$> 5 \text{ mW}$

Electrical Excitation Module

Maximum Voltage	$\pm 5 \text{ V}$ ($\pm 10 \text{ V}$)
Pulse Width	6 ns–999.99 s
Repetition Rate	1 μHz –80 MHz
Electrical Pulse Rise Time (0-5 V)	$\leq 5 \text{ ns}$ (Default) , optional $\leq 2 \text{ ns}$

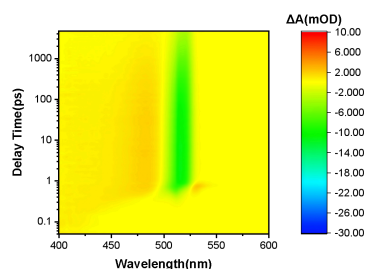
Ultrafast Transient Absorption Application Examples

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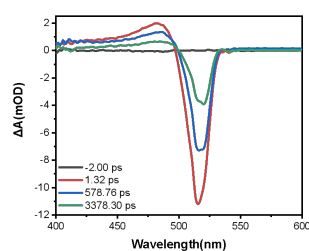
UV Range Data

Sample Experiment

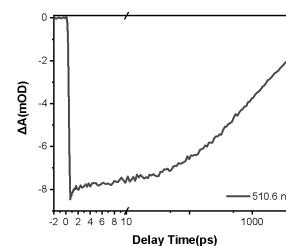
Sample	Perovskite Thin Film
Excitation wavelength	405 nm
Probe wavelength	UV



Pseudo-Color Maps



TA Spectra



TA Kinetics

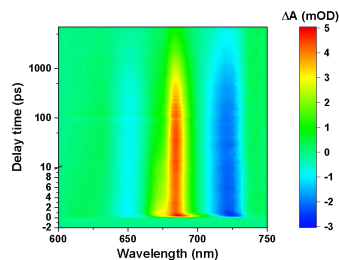
Visible Range Data

Sample Experiment

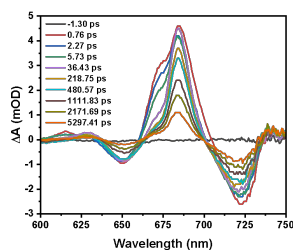
Sample Ni-TPA

Excitation wavelength 370 nm

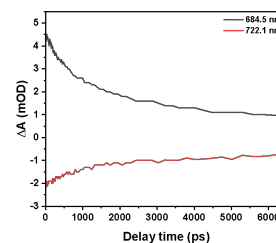
Probe wavelength Visible



Pseudo-Color Maps



TA Spectra



TA Kinetics

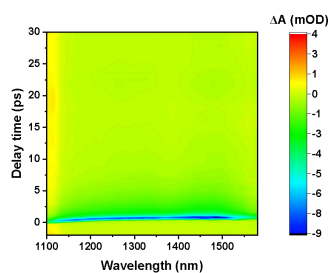
NIR Range Data

Sample Experiment

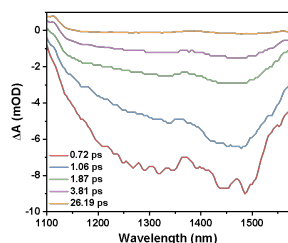
Sample Graphite

Excitation wavelength 495 nm

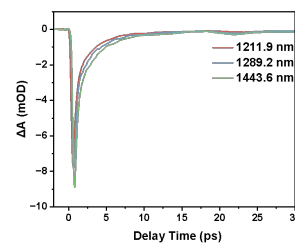
Probe wavelength NIR



Pseudo-Color Maps



TA Spectra



TA Kinetics

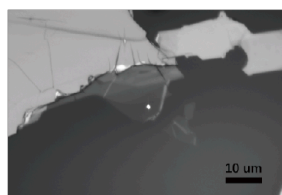
Micro Transmission TA

Sample Experiment

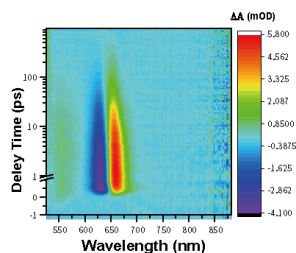
Sample Single layer WS₂ (substrate: sapphire)

Excitation wavelength 515 nm

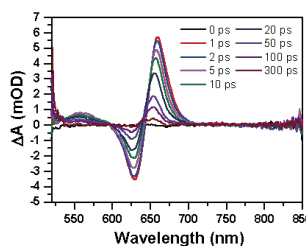
Probe wavelength Visible



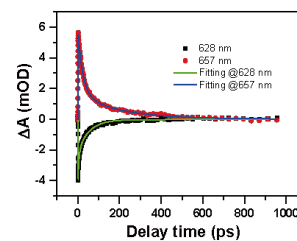
Bright-Field Imaging



Pseudo-Color Maps



TA Spectra



TA Kinetics

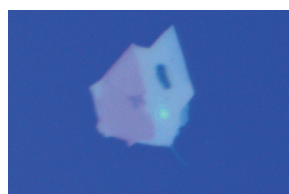
Micro Reflection TA

Sample Experiment

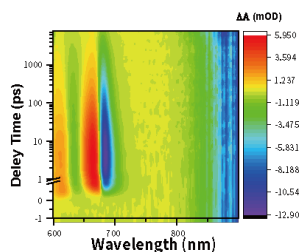
Sample: Multilayer WS₂ (substrate: Si)

Excitation wavelength: 515 nm

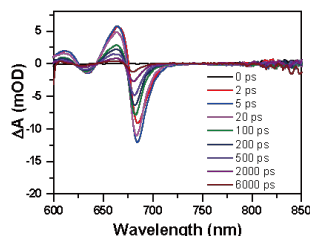
Probe wavelength: Visible



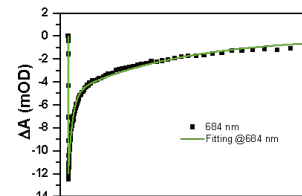
Bright-Field Imaging



Pseudo-Color Maps



TA Spectra



TA Kinetics

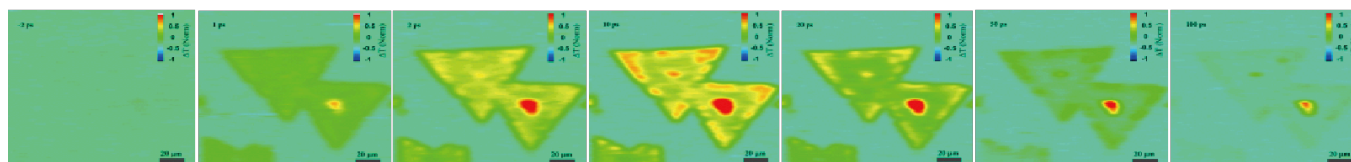
Wide-field TA Imaging

Sample Experiment

Sample: Monolayer WS₂

Excitation wavelength: 515 nm

Probe wavelength: 610 nm



-2 ps

1 ps

2 ps

10 ps

20 ps

50 ps

100 ps

Transient Absorption Imaging

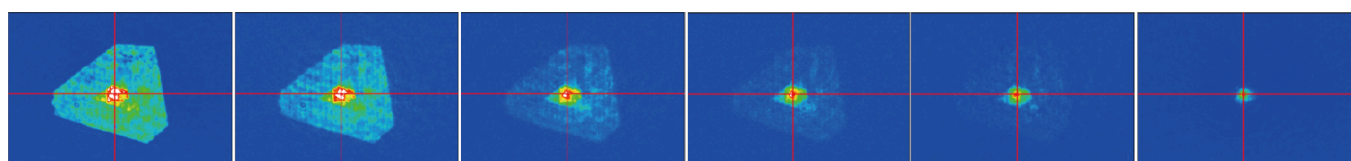
Near Infrared Imaging

Sample Experiment

Sample: WS₂

Excitation wavelength: 515 nm

Probe wavelength: 900 nm



2.1 ps

3.5 ps

5 ps

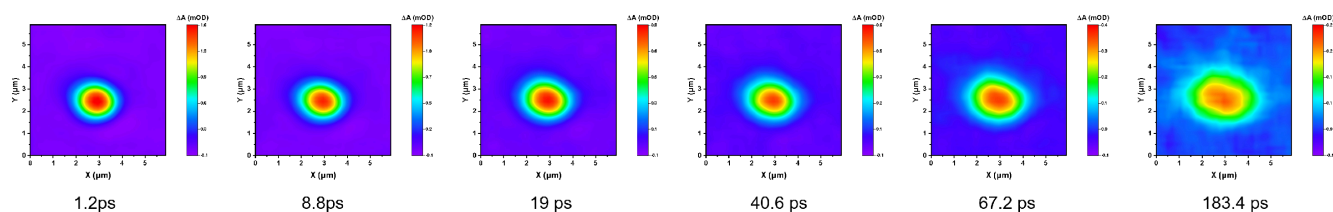
6.9 ps

11.5 ps

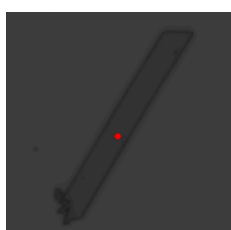
37 ps

Transient Absorption Imaging

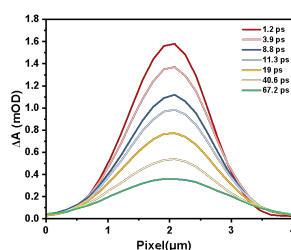
Sample	Perovskite-type Copper Fluoro-oxytitanate
Excitation wavelength	650 nm
Probe wavelength	800 nm



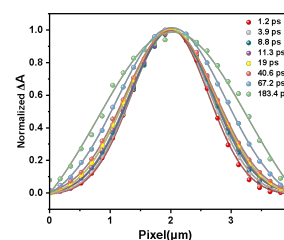
Visualization of Carrier Diffusion



Sample Profile



Carrier Diffusion Data

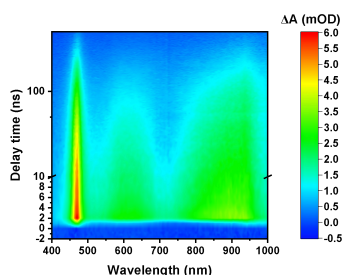


Fitted Normalized Carrier Diffusion Data

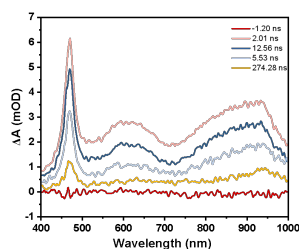
Nanosecond Transient Absorption

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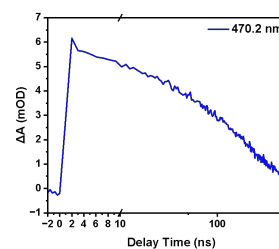
Sample	SiC
Excitation wavelength	343 nm
Probe wavelength	400-1000 nm



Pseudo-Color Maps



TA Spectra

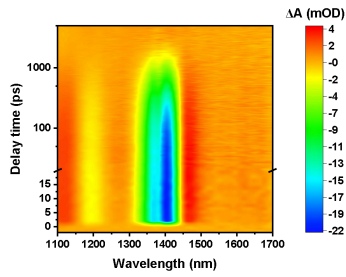


TA Kinetics

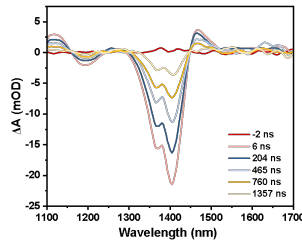
NIR Detection

Sample Experiment

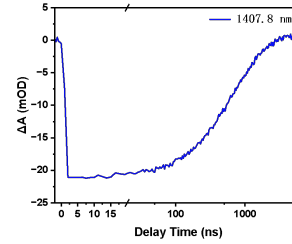
Sample	PbS
Excitation wavelength	343 nm
Probe wavelength	1100-1700 nm



Pseudo-Color Maps



TA Spectra

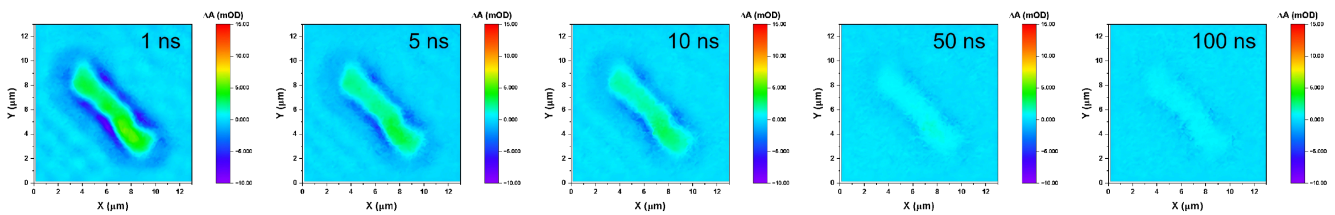


TA Kinetics

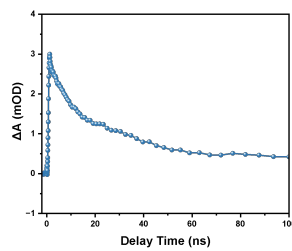
Nanosecond Transient Absorption Kinetic Imaging

Sample Experiment

Sample	MoS ₂
Excitation wavelength	515 nm
Objective Lens	40X



Nanosecond Transient Absorption Imaging

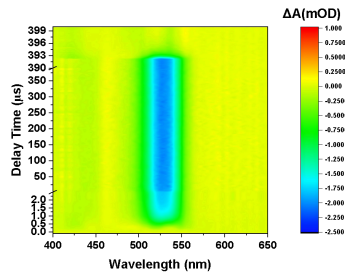


Nanosecond Transient Absorption kinetics

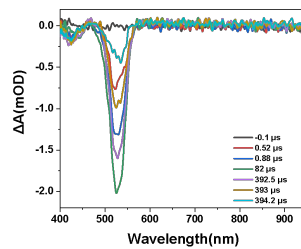
Electrically Pumped QLED Testing

Sample Experiment

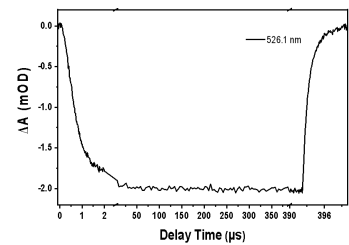
Sample	Green QLED
Excitation Voltage	6 V, duty cycle 40%
Data Points	300
Detection Range	400-900 nm



Pseudo-Color Maps



TA Spectra

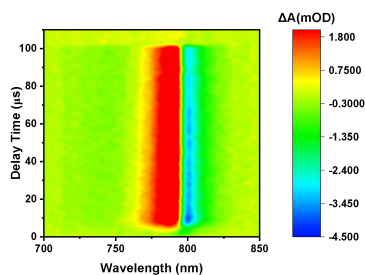


TA Kinetics

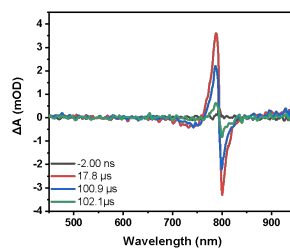
Electrically Pumped QLED Testing

Sample Experiment

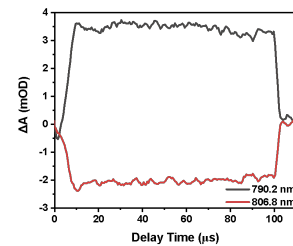
Sample	Perovskite Solar Cell
Excitation Voltage	1.2 V, duty cycle 10%
Data Points	200
Detection Range	450-950 nm



Pseudo-Color Maps



TA Spectra



TA Kinetics