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LOW OPTICAL ABSORPTION MEASUREMENT REPORT

SAMPLE: PO6138

Request from		Testing institute	
Address	OPTOMAN Ukmergės pl. 427 LT-14183 Vilnius Lithuania	Address	UAB Lidaris Saulėtekio al. 10 10223 Vilnius Lithuania
Contact person	Vaida Grašytė	Tester	Edvinas Zacharovas
Inquiry ID	3001	Sale order	SO4017
Purchase order	PO6371	Test ID	YM38JE
		Test date	2023-07-24

Specimen

Name	PO6138
Type	Polarizer Coating (Rs > 99.9% @ 1020 nm - 1040 nm + Tp>99.0% @ 1020 nm - 1040 nm)
Dimensions	Ø12.7 x 3.0 mm
Packaging	Plastic box
Storage before test	Normal laboratory conditions
Dust blow-off	None
Cleaning	None

Measurement

Method	Photothermal common-path interferometry (PCI)
Protocols	Longitudinal scan (L-scan), Time scan, Transverse scan (T-scan).

SUMMARY OF MEASUREMENT RESULTS

Wavelength	AOI	Polarization	Location	Sample absorption *
1070.0 nm	49.0 deg	Linear P	Front surface (S1)	$8.72^{+0.31}_{-0.26}$ ppm

* Sample absorption is evaluated from Transverse scan protocol.

TEST EQUIPMENT

Definitions and test description

Photothermal common-path interferometry (PCI) for low absorption measurements is based on spatially resolved pump-probe techinque: low power probe beam senses the heating effect of an absorbed pump beam [1]. Several different scanning protocols are performed to measure the absorption of the sample.

Irradiation sources	Pump laser	Probe laser
Manufacturer	IPG Photonics	Lumentum
Model	YLR-10-LP	1122P
Type	Continuous wave Ytterbium fiber	Continuous wave HeNe
Central wavelength	1070 nm	632.8 nm
Angle of incidence	(49.0 ± 1.0) deg	(56.0 ± 1.0) deg
Polarization state	Linear P	Linear S
Spatial beam profile in target plane	TEM00	TEM00
Beam diameter in target plane (1/e2)	(59.6 ± 5) µm	(210 ± 5) µm
Average power	(4.1890 ± 0.0060) W	(2.00 ± 0.05) mW

Measurement setup calibration	Surface
Calibration sample	UVFS Metallic Filter
Absorption	21.0 %
Correction fator	1.0
Responsivity	$54.4^{+0.6}_{-0.6}$ 1/W

Power meter	
Manufacturer	Ophir
Model	12A-P
Calibration due date	2024-04

Test environment	
Environment	Air
Cleanroom class (ISO 14644-1)	ISO7
Pressure	1 bar
Temperature	22 C
Humidity	65 %

[1] A. Alexandrovski, M. Fejer, A. Markosian, and Roger Route "Photothermal common-path interferometry (PCI): new developments", Proc. SPIE 7193, Solid State Lasers XVIII: Technology and Devices, 71930D (28 February 2009)

LONGITUDINAL SCAN (L-SCAN) RESULTS

Scan parameters

Scanning axis	Longitudinal (from S1 to S2)
Scanning distance	3.5 mm
Scanning step	20 µm
Pump laser power	(4.1911 ± 0.0059) W
Number of scans	1

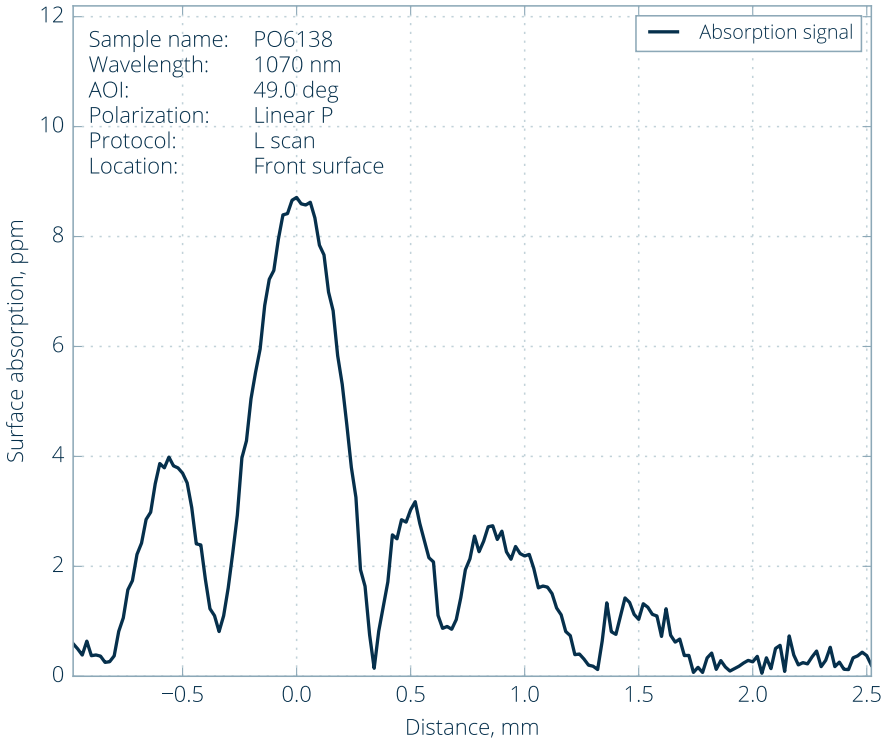


Figure 1. Longitudinal scan.

TIME SCAN RESULTS

FRONT SURFACE (S1)

Scan parameters

Scanning axis	Time
Scanning duration	683 s
Scanning step	1 s
Pump laser power	(4.1921 ± 0.0055) W
Number of scans	1

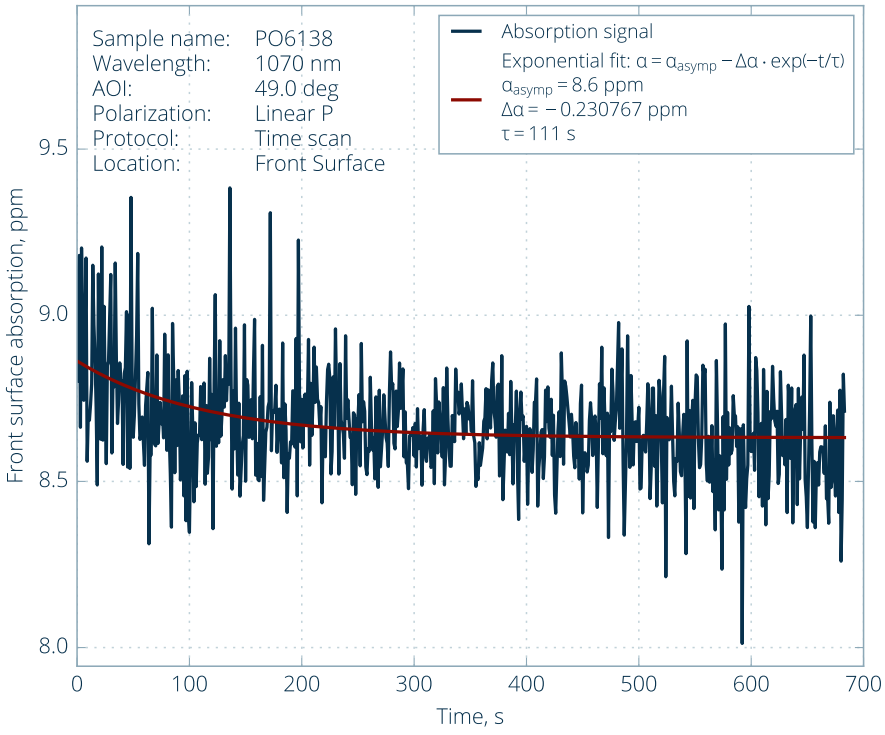


Figure 2. Time scan on front surface (S1).

TRANSVERSE SCAN (T-SCAN) RESULTS

FRONT SURFACE (S1)

Definitions and protocol description

Sample absorption is defined as median absorption value of T-scan measurement. Uncertainty is evaluated as minimum and maximum absorption values of T-scan measurement without outliers, i.e. within range [Q1 - 1.5 · IQR, Q3 + 1.5 · IQR], where Q1 - first quartile, Q3 - third quartile, IQR - interquartile range.

Scan parameters

Scanning axis	Transverse (vertical)
Scanning distance	3.0 mm
Scanning step	35 µm
Pump laser power	(4.1890 ± 0.0060) W
Number of scans	1

Scan results

Sample absorption	$8.72^{+0.31}_{-0.26}$ ppm

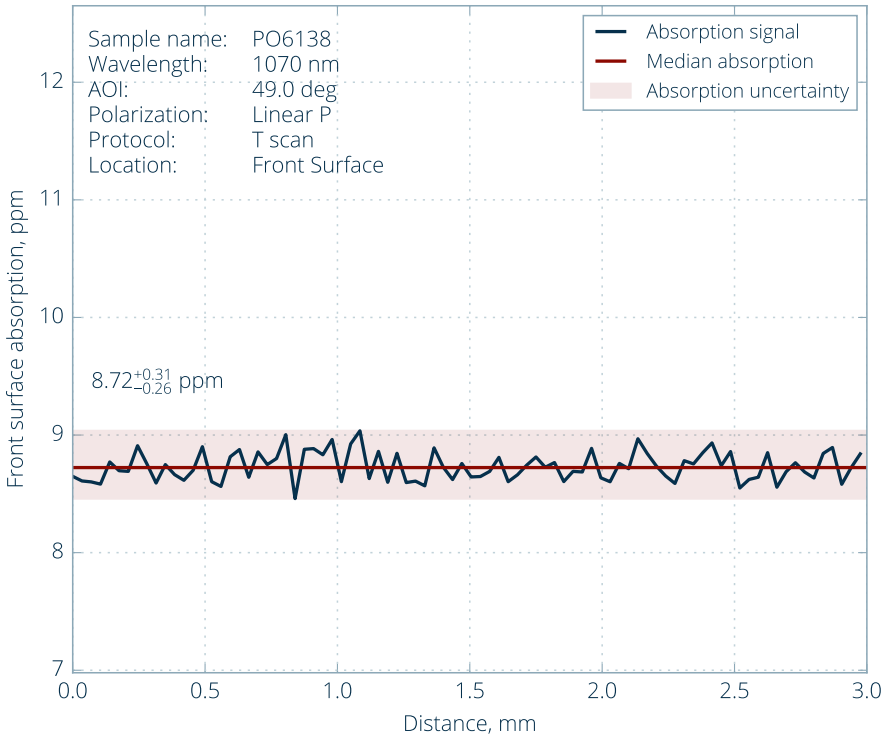


Figure 3. Transverse scan on front surface (S1).