

Laser-Induced Damage Threshold (LIDT) Measurement Report

ISO21254-2: S-on-1 Test Procedure

Sample: R14006-13

Request from:

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Tester/date:

E. Pupka / 2015-06-10

Specimen

Name of sample:

R14006-13

Type of specimen:

Yb:YAG, IBS dielectric coating

Storage, cleaning:

Plastic box, wrapped in paper for optics

Test specification

First harmonic of pulsed Nd:YAG InnoLas Laser: SpitLight Hybrid laser ($\lambda = 1064$ nm, linear polarization, pulse duration 10.2 ns), $\lambda/2$ plate combined with additional polarizer attenuator, online scattered light damage detection, offline inspection of damage detection using Nomarski microscopy (100x).

Laser parameters used for testing

Wavelength:	1064 nm
Angle of incidence:	0 deg.
Polarization state:	linear
Pulse repetition frequency:	100 Hz
Spatial beam profile in target plane:	TEM ₀₀
Longitudinal beam profile:	Single mode (SLM)
Beam diameter in target plane _(1/e²) :	252.3 ± 4.9 μm (average from 64 pulses)
Pulse duration:	10.2 ns

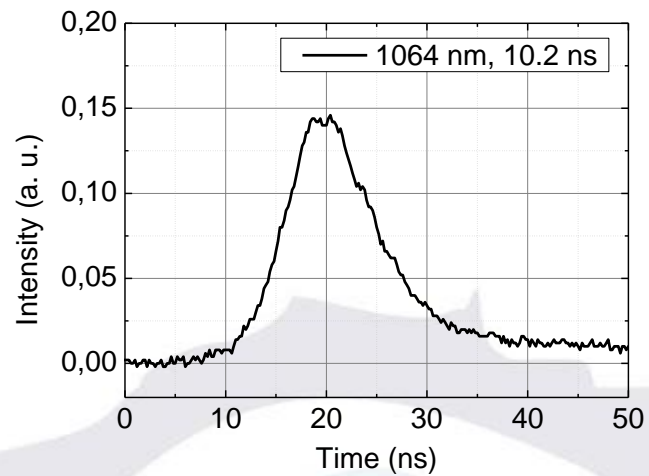
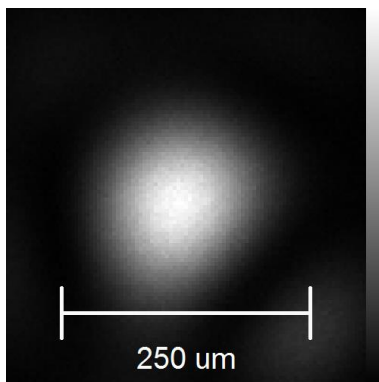


Fig. 1. Spatial beam profile in target plane (left) and oscilloscope curve (right).

Test procedure:

Number of sites per specimen:

Arrangement of test sites:

Minimum distance between sites:

Damage detection:

Storage of the specimen:

Test environment:

Cleaning:

Definition of LIDT:

S-on-1 test

212

equally spaced

875 μm

Scattered light diode

Manufacturer's packaging,
normal laboratory conditions

Industrial environment

Dust blown off with clean air

Nonlinear fit to 0% of damage Probability

Test result:

Table 1. Summarized LIDT's for sample R14006-13.

Test mode	Threshold - front surface, J/cm ²	Threshold - rear surface, J/cm ²
10-on-1	Insufficient data. (See technical note)	15.19 ≤ 18.16 ≤ 20.93
1000-on-1	Insufficient data. (See technical note)	11.25 ≤ 13.22 ≤ 15.07

Measured at LIDARIS 2015-06-10

www.lidarisis.com

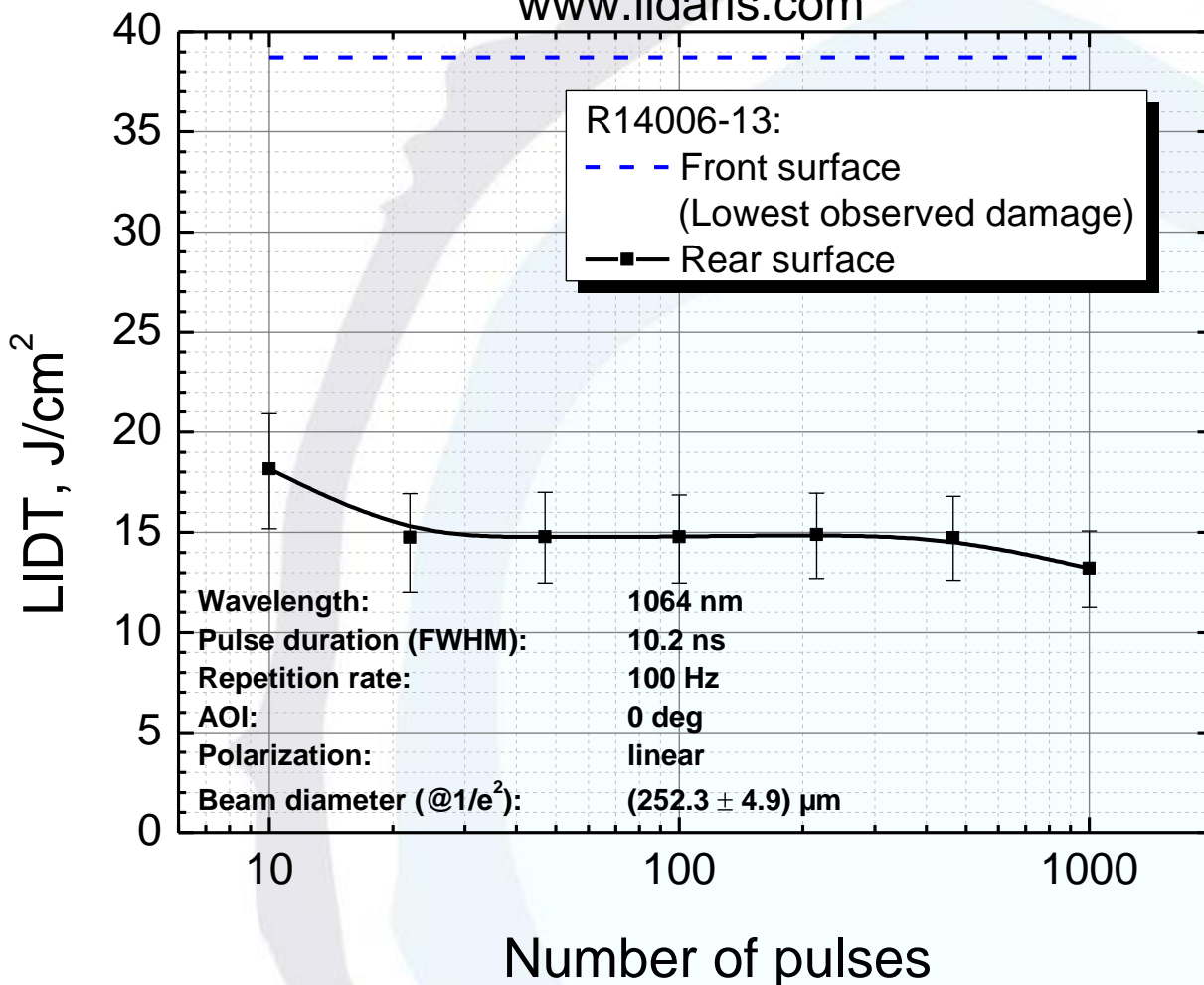


Fig. 2. Characteristic damage curve.

Typical damage morphology:

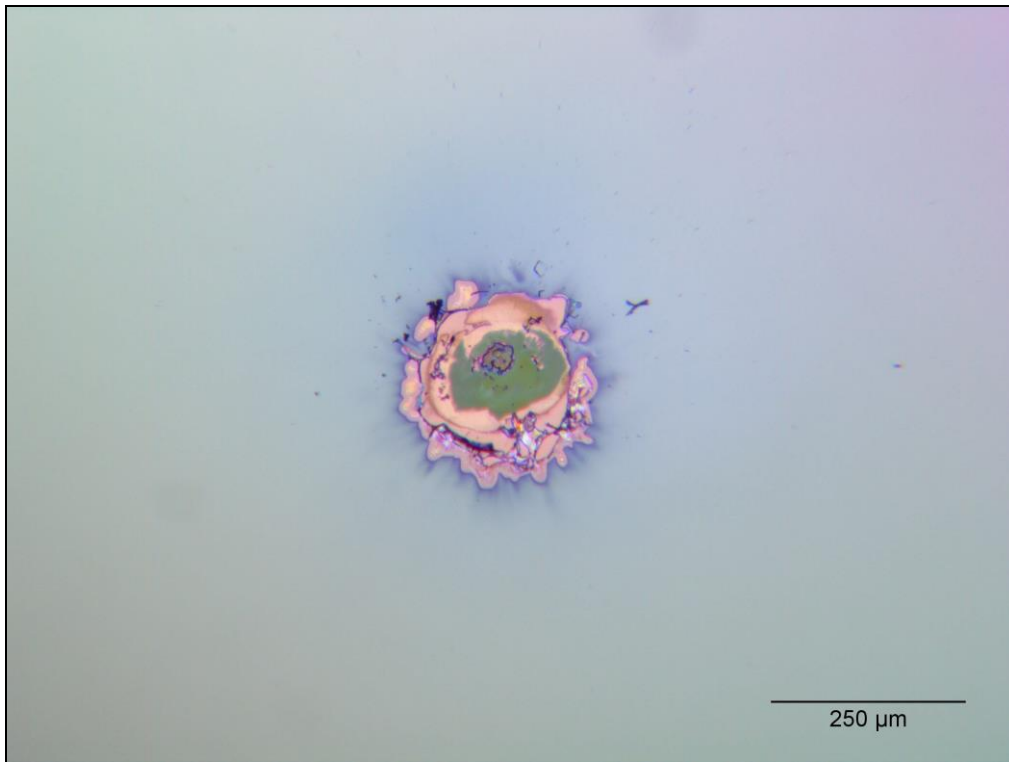


Fig. 3. Typical front surface damage morphology
(Energy density 38.72 J/cm^2 , damage after 9 pulses)

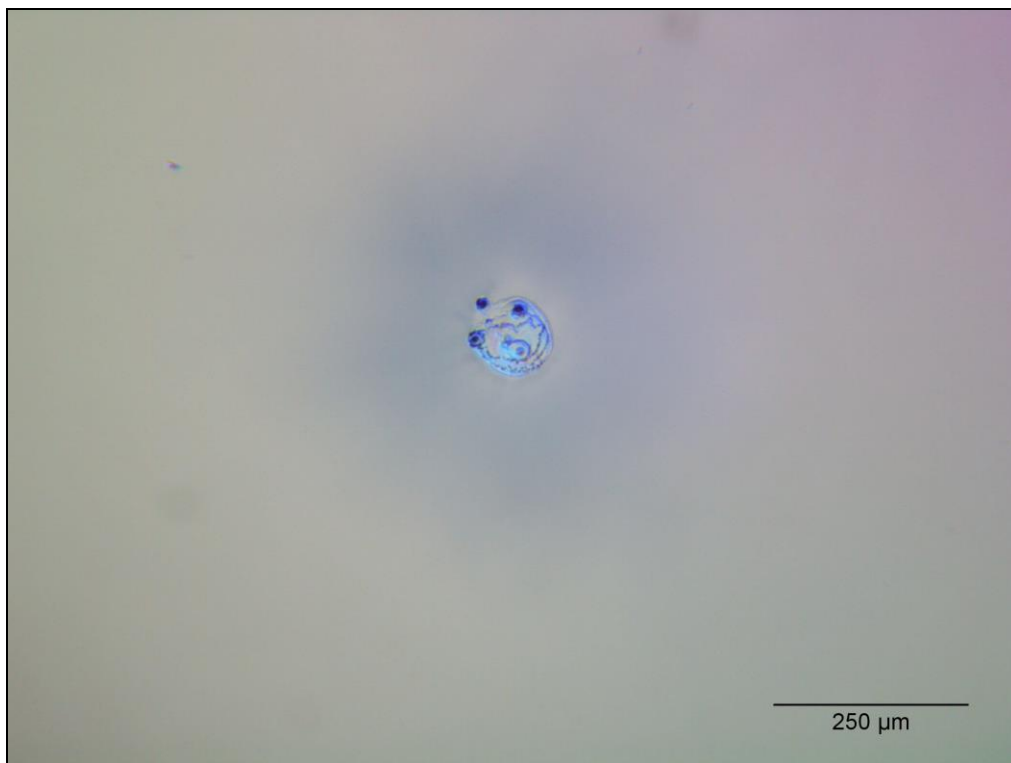


Fig. 4. Typical rear surface damage morphology
(Energy density 32.68 J/cm^2 , damage after 6 pulse)

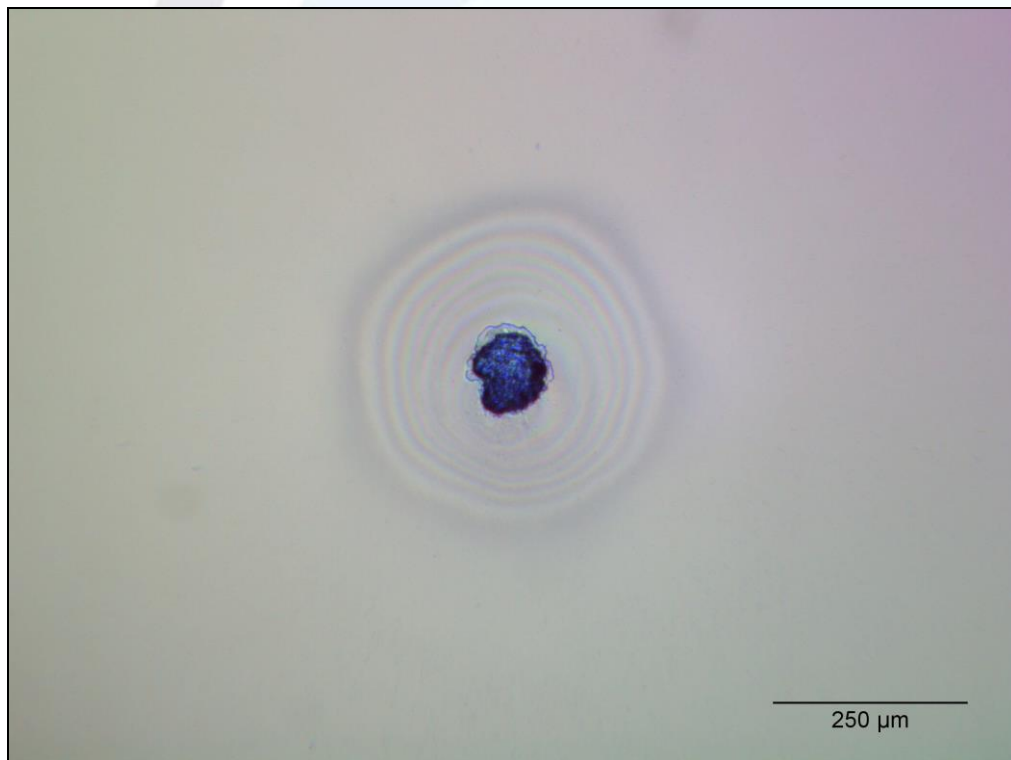


Fig. 5. Typical rear surface damage morphology
(Energy density 16.15 J/cm^2 , damage after 743 pulses)

Technical note:

Only 1 site out of 212 was damaged on the front surface, which is not enough to reliably evaluate the LIDT. Lowest observed damage was at 38.72 J/cm^2 after 9 pulses (see Fig. 3.)