Laser Induced Damage Threshold (LIDT):
(S-on-1 test procedure: ISO 11254 – 2)

Request from: Altechna Co. Ltd. (Remigijus Šliupas)

Testing institute

Testing institute: Vilnius University,
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Tester/date: J. Mirauskas, M. Ščiuka, A. Melninkaitis / 2011-05-07

Specimen

Name of sample: Optical substrate, UVFS, S97-11RS
Type of specimen: AR/AR @ 266–320 nm, AOI=0, 2 mm;
Storage, cleaning: No cleaning.

Test specification

Forth harmonic of pulsed Nd:YAG NL303 G laser (λ = 266 nm, linear polarization, pulse duration 3,6 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

Wavelength: 266 nm;
Angle of incidence: 0 deg;
Polarisation state: linear;
Pulse repetition frequency: 10 Hz;
Spatial beam profile in target plane: TEM_{00};
Longitudinal beam profile: Multimode;
Eff.beam diameter in target plane$_{(1/e^2)}$: 104 ± 1 μm (average from 30 pulses);
Pulse duration: 3,6 ns;

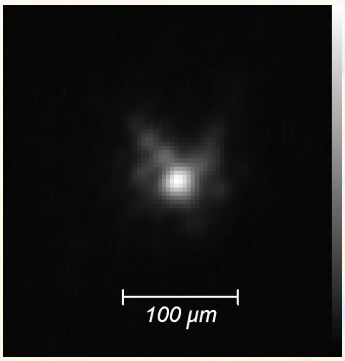

Fig. 1. Spatial beam profile in target plane.

Test procedure: S-on-1 test

Number of sites per specimen:	500;
Arrangement of test sites:	Equally spaced;
Minimum distance between sites:	300 μm;
Damage detection:	Scattered light diode;
Storage of the specimen:	Wrapped into optical paper;
Test environment:	Industrial environment;
Cleaning:	No;
Definition of LIDT:	Fit of damage probability to 0%;

Test result of *UVFS*

LIDT $_{1\text{-on-}1}$ = 2,9 ± 0,4 J/cm^2
LIDT $_{1000\text{-on-}1}$ = 2,8 ± 0,4 J/cm^2

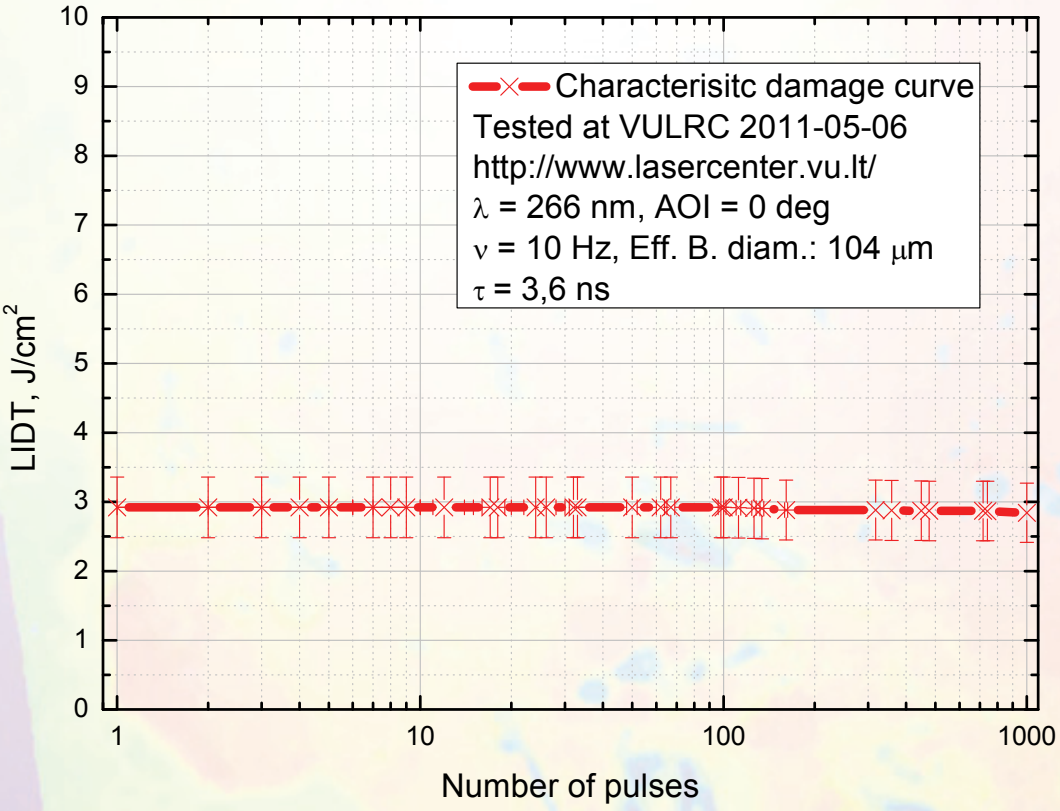

Fig. 2. Characteristic damage curve.

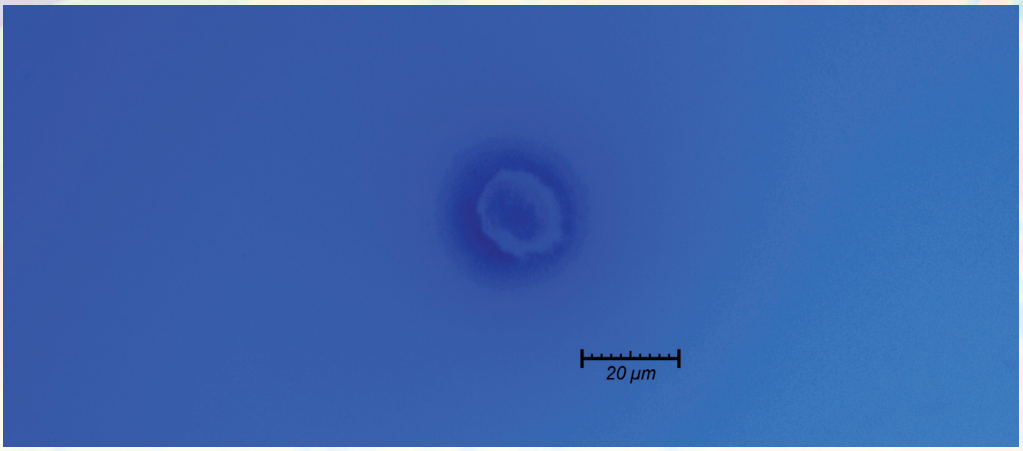

Fig. 3. Typical damage morphology
(Energy density 3,04 J/cm^2, damage after 449 pulses)

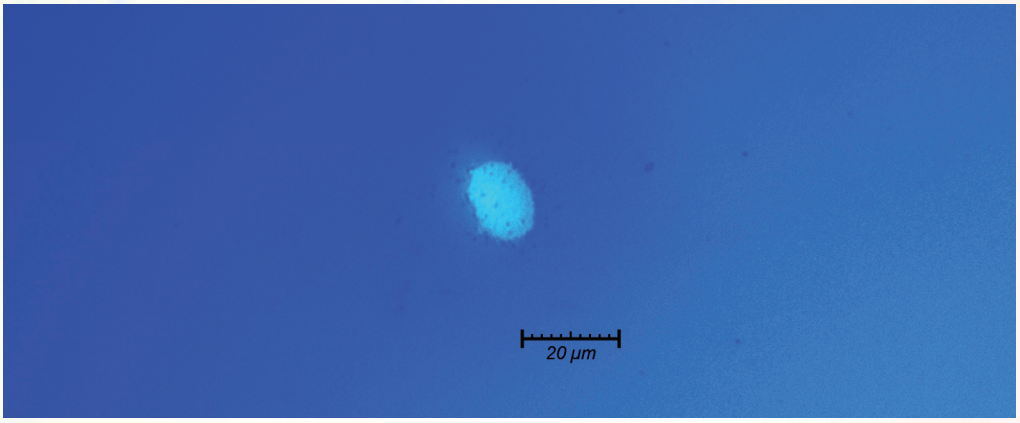

Fig. 4. Typical damage morphology
(Energy density 3,49 J/cm^2, damage after 1 pulse)

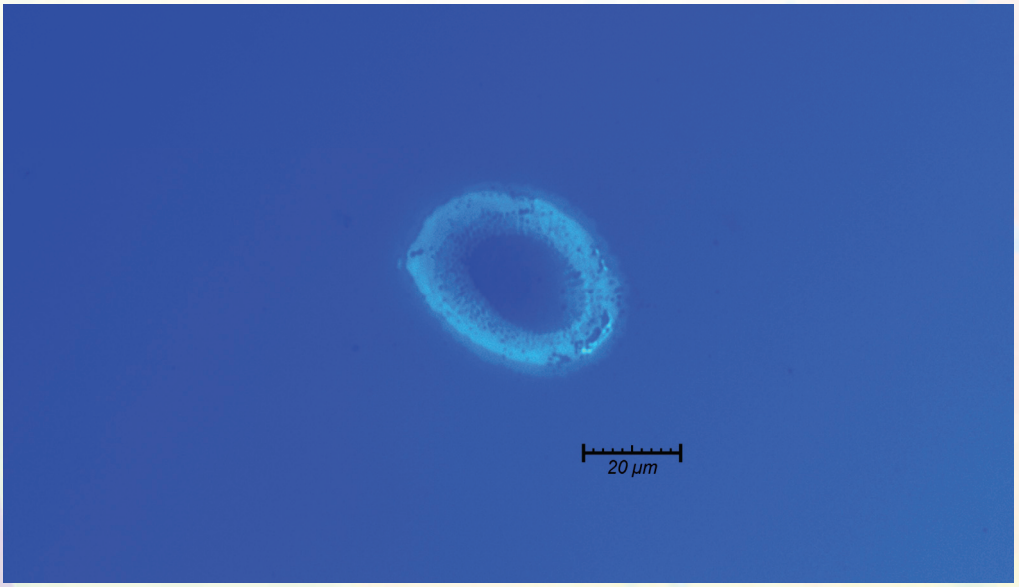

Fig. 5. Typical damage morphology
(Energy density 6,53 J/cm^2, damage after 1 pulse)