RhySearch
Das Forschungs- und Innovationszentrum Rheintal

LID

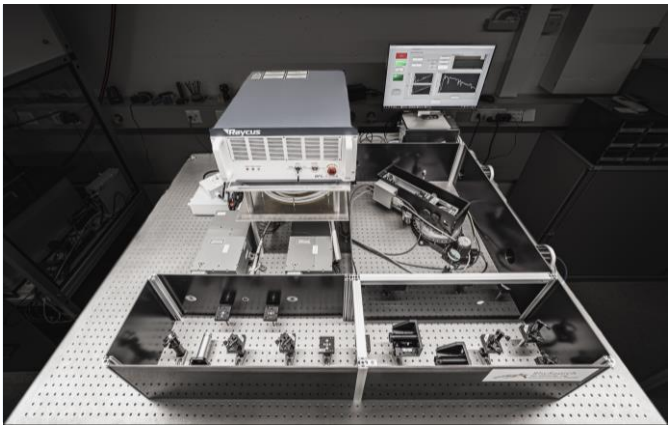
LASER-INDUCED DEFLECTION

Quantitative absorption measurement

The LID measurement method is very sensitive and quantifies the absorption of low loss optical components. It can be used to measure the absorption of single- and multilayer coatings as well as uncoated substrates.

The absorption of coatings can have various unwelcome effects. Laser induced damage, thermal lensing, reduced long-term stability and wavefront deformation are just a few examples. Therefore, quantification of the absorption is important for a lot of optical components where such effects are undesirable. For example, in high-power laser applications the LIDT mainly depends on the absorption. Consequently, LID offers a very useful option to characterize a variety of optical coatings.

When a pump laser hits the sample, a thermal lens is created by the absorption. The thermal lens induces a refractive index gradient in the material. A probe laser passes through this thermal lens – close to the pump laser position – and is deflected due to the refractive index gradient. This deflection is proportional to the laser power and absorption of the material. With a calibration one can get the deflection at 100% absorption and therefore measure the absorption quantitatively.



Laser sources
1064 nm Fiber Laser
532 nm DPSS pulsed Laser
355 nm DPSS pulsed Laser

Test conditions
0° + 45° AOI
Sensitivity: single ppm
Measurement uncertainty 10%
Transmissive at 633 nm
Max. sample size 2’’

Standard
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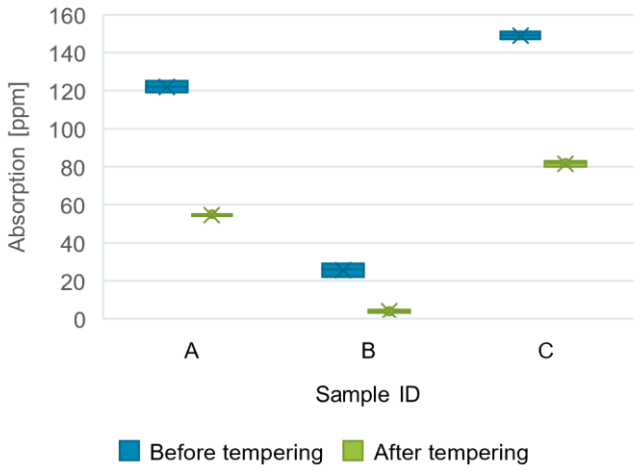

Example for absorption measurement before and after tempering

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