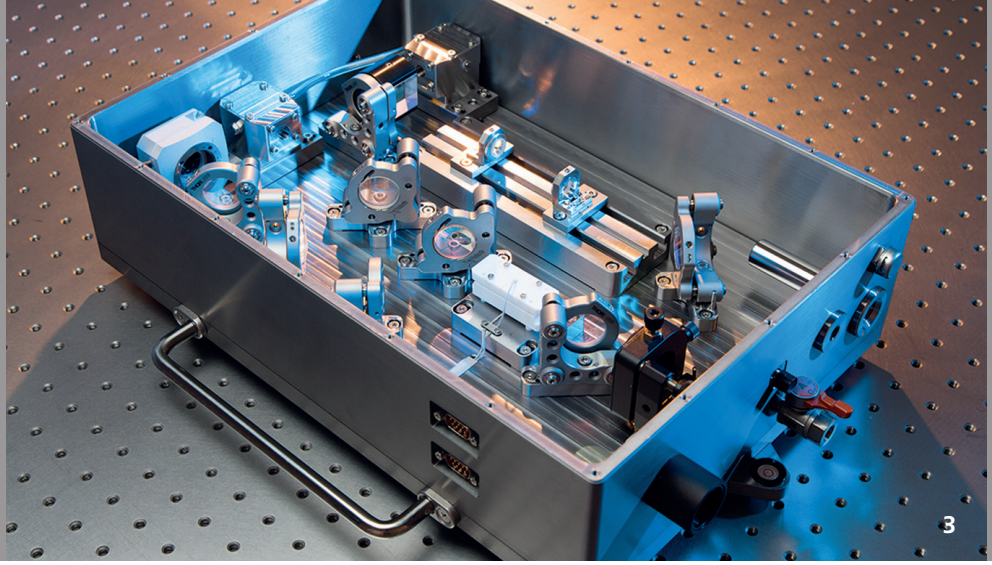

HIGH-POWER SHORT PULSE LASER WITH ADDRESSABLE WAVELENGTHS IN THE IR

Task

Many technically and economically interesting classes of materials exhibit significantly increasing absorption in the SWIR range (λ = 1.5 to 3.5 µm). The number of innovative application ideas that would exploit this, however, faces a lack of sufficiently powerful short-pulse lasers in this wavelength range.

Method

Fraunhofer ILT has designed optical parametric generators (OPG) based on periodically poled nonlinear optical crystals for the generation of process-adapted laser wavelengths in the IRB. As pump lasers, established platforms have been used with an output wavelength of 1 µm. In the OPG the short-wave radiation of the laser driver is converted in a single pass through the nonlinear optical crystal in two long-wave radiation fields (signal and idler wave). By manipulating the so-called phase matching, e.g. by heating the nonlinear crystal, the wavelength pair of signal and idler wave can be tuned. The optical design of the converter can be adapted to pulse durations of femtoseconds to nanoseconds. The emission bandwidth of the converter, seeded with a continuous, low-power radiation field, can also be selectively tailored to specific application requirements.

Result

Fraunhofer ILT has achieved output power of up to over 20 W in the wavelength range between 1.6 µm and 3.0 µm with pulse durations between 900 fs and 1.5 ns based on OPG. Current projects address power scaling to more than 50 W. For use as a test system in various application tests, the experimental setup has been equipped with an independent, dustproof sealed box. Thanks to its variable lens sets, the converter can be adapted to the beam characteristics of different laser drivers, thus providing a wide range of different application parameters.

Applications

The solution presented here allows initial feasibility studies to be made for a wide range of applications of wavelength-flexible IRB lasers with short pulses. Moreover, it enables the commercial provision of innovative, process-optimized beam parameters in the IRB, based on established 1 µm laser platforms when adapted special sources are not yet available or their development is not economical due to a limited market volume.

Contacts

Florian Elsen M.Sc.
Telephone +49 241 8906-224
florian.elsen@ilt.fraunhofer.de

Dr. Bernd Jungbluth
Telephone +49 241 8906-414
bernd.jungbluth@ilt.fraunhofer.de

3 Converter box for application studies with IRB wavelengths.