



ROBUST, COMPACT HIGH-POWER ULTRAFAST AMPLIFIER BASED ON YB-INNOSLAB

Task

Based on the Yb:YAG INNOSLAB concept developed at Fraunhofer ILT, ultrafast amplifiers have been customized for the laser manufacturer Amplitude Systèmes. In addition, know-how transfer to Amplitude will ensure that these 400 W power amplifiers for sub-ps pulses will continue to be developed and adapted.

Method

In view of the special demands on compactness, simplicity of adjustment and robustness against environmental conditions, Fraunhofer ILT fundamentally revised the existing Yb-INNOSLAB amplifier platform. Based on this, two prototypes for Amplitude Systèmes were built and characterized in-depth experimentally. In addition, Amplitude staff was trained at Fraunhofer ILT on the design and adjustment of the INNOSLAB amplifiers – an important part of the know-how transfer.

Results

The prototypes demonstrated that 5 W of seed power could be amplified to over 500 W of output power at pulse durations < 500 fs. Without chirped pulse amplification, the system was operated at repetition rates of 20 MHz, i.e., pulse energies > 25 μ J. Climatic and 24-hour tests demonstrated that the temperature behavior and the long-term stability of the laser power are suitable for industrial use.

Applications

Amplitude Systèmes has integrated the laser system into commercial laser systems for, among other things, use in materials processing, metrology and science.

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3 High-power INNOSLAB amplifier (middle)
integrated in a commercial laser system.