



SLAPCOPS – LASER CONCEPT FOR TERAHERTZ MEASUREMENT SYSTEMS

Time-resolved measurement of signals in terahertz time domain spectroscopy requires two variable laser pulses with a time delay between them. Until now, a mechanical displacement unit or two light sources achieve the necessary time delay. We have built a laser system working without a mechanical positioning unit and just one laser. Introducing the SLAPCOPS system.

The majority of systems developed and in use now in the department are based on ultrashort pulsed lasers in conjunction with optical delay units. These two components are necessary to record processes on a scale of picoseconds. (One second consists of a trillion picoseconds, a time scale that currently cannot be achieved with electronic systems). Terahertz pulses are electromagnetic pulses lasting one picosecond, which enable a thickness analysis of multi-layer coatings like automobile paint, in a non-contact and non-destructive manner – a fundamental advantage over other technologies.

Lower costs, higher measurement rates

Ultrashort pulsed lasers and delay units continue to dominate the cost of many terahertz measurement systems. Our researchers have found an innovative approach while working on a PhD project that combines these two components into a single, less expensive device.

In addition to the cost advantage, much faster measurements are possible with the new measuring device. The new method also provides a high degree of flexibility that facilitates uncomplicated solutions to a variety of measurement problems. The patented invention also permits the measurement of very thick layers or even walls in a single measurement, which was not readily feasible with conventional terahertz systems. The optical systems currently in use can supply approximately 50 measurements per second, whereas the SLAPCOPS system enables more than 1000 measurements per second.

International scientific success

The scientific success of SLAPCOPS is already assured by presentations at international conferences and several publications in prestigious journals. To protect our established know-how in this area, we have filed intellectual property applications and several patents have been granted.

1 Fiber splicing device connecting two fiber ends; the connection process is a basic prerequisite for implementing fiber lasers.

2 Characteristic green glow of an active fiber, representing a key component of the SLAPCOPS laser system

