

Community

Conference Notes

UKP Workshop (Review)

Aachen, Germany, 17. – 18. April, 2013

Ultrashort pulsed lasers finally arrived in the field of industrial laser material processing. This is the message of the UKP workshops, where UKP stands for ‘Ultrakurze Pulse’ (ultra short pulses). The workshop is arranged every other year by a team from the Fraunhofer Institute for Lasertechnology ILT in Aachen, Germany. The focus of the two-day meeting is the application of ultrashort pulses in material processing and everything that is necessary to facilitate this (Figure 1).

The first take-away message of this year’s workshop was that the beam sources have become a minor topic. Devices with up to 50 Watt average power and more have arrived in various production lines and are used 24/7. Hundreds of devices are sold to industry each year, service is

available on a global scale. Special developments such as high power systems (>1 kW in IR) indeed are an issue, but even there several companies compete already and the technology looks ready for market. Another developmental direction might be microlasers, such ultra-compact devices are now also available with sub- ns pulses, as Stefan Spiekerman from Innolight (acquired by Coherent in 2012) showed. Such systems might be applied in photovoltaics (CIGS) or for some general processes such as diamond saw redressing.

Currently, major limitations for the wider application of this sophisticated technology seem to be optics and beam delivery. Fiber optics for beam delivery are not available, special scanners for pulse repetition rates >1 MHz are under development. This is rather important since the pulse energy of such lasers is usually limited to some micro Joules and efficient up scaling is achieved by higher repetition rates. Markus Zecherle from Scanlab AG presented a hybrid solution with a combined galvo and polygon scanner



Figure 1 The workshop was held at the winding-engine house of the former coal mine ‘Zeche Anna’. Some machines are visible behind workshop organizer Arnold Gillner while giving his concluding remarks.

system. The spatial resolution on the work piece is smaller than the spot size, smaller displacements of the target wafer are corrected by a visual tracking system. The scan speed goes up to 180 m/s, that allows processing of a wafer in 4 s.

The last part of the workshop was filled with reports from the German project SMARTSURF, which dealt mainly with process development for surface modification of sliding faces in cylinders.

Conclusions

There was one interesting message aside of the presentations: Short pulse laser applications are not necessarily ‘cold’ processes! If pulses deposit their energy with high repetition rate in the work piece it will heat up as with every other laser. The only difference is in the single laser shot: It has a smaller heat affected zone compared to other lasers. But when used for any material processing, some heat (particularly at less than perfect beam profiles) gets deposited in the material and heats it up. Fast movement of the beam or lower rep rates may help.

During the workshop it became apparent that the most interesting topic of the next meetings will be

process development. As the main organizer Arnold Gillner said “Projects which were presented last time as a prototype now arrive at the production floor”. Drilling and cutting are making progress; surface modification and PCB processing were discussed. Still, key markets such as semiconductor processing and photovoltaics wait for a reduction of prices and an increase in productivity.

The next UKP workshop will take place on April 22 and 23 in 2015. Most of the participants will probably meet in a special symposium at AKL 2014 already.

<http://www.ultrakurzpuls laser.de/>

LASER – World of Photonics (Review)

Munich, Germany, 13.-16.5. 2013 (Congress: 12. – 16.5. 2013)

In the second week of May the world of photonics met again in Munich for the LASER trade show and congress. Although scheduled one month earlier than usual, the weather was splendid once again and whoever found the time enjoyed an evening in the city’s famous beer gardens.

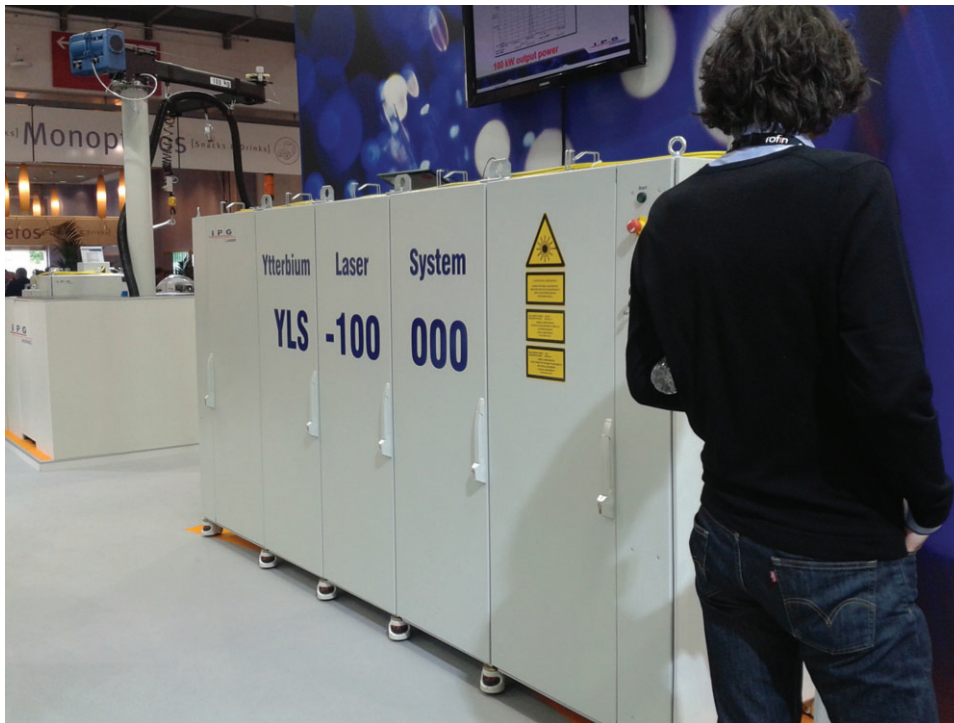


Figure 2 Eye catcher for solid state laser experts: The 100 kW fiber laser from IPG Photonics. It was recently shipped to a research institute in Japan for work on special materials processing applications. (Photo: Mike Hatcher/optics.org).

The next Laser World of Photonics will be in June again, from 22 to 25 June 2015.

In its 40th year, the event defended successfully its position as the world's largest trade show on photonics technology with about 27 000 visitors (equal to 2011) and a new record of 1136 exhibitors. The proportion of foreign visitors rose to a record level of 54%. Significantly more visitors came from China, Russia and South Korea.

New industry report: solid growth of the global photonics industry

On the first day of the trade fair, the Federal Ministry of Education and Research (BMBF) presented the 'Photonics industry report 2013', drawn up in collaboration with the German industry associations SPECTARIS, VDMA and ZVEI. The study found that the global photonics market in 2011 was worth around €350 billion – compared with €228 billion in 2005. As such, notwithstanding the financial crisis, the Photonics industry is posting solid average annual real growth of around 6.5%. According to this report, the German photonics industry employs 134 000 people. Further growth to 165 000 people is expected by the end of the decade.

The trade show

The four halls were crowded from the very first moment and significant traffic went on throughout all four days. Hot topics were again solid state lasers, in particular fiberlasers in the kW-class, short pulsed lasers for industrial applications and direct diode lasers. Accordingly, the application panel entitled 'Advanced Solid State Lasers and Fiber Lasers – Trends and Markets' was very well attended.

While most leading laser companies presented kW-fiberlasers, it was IPG Photonics to show their position in the field with a 100 kW system (Figure 2). According to a recent article from optics.org, it was shipped to a research institute in Japan for work on remote materials processing applications.

Ultra short pulsed lasers make their way into industry now (see report from the UKP workshop in Aachen above). Interestingly, the opposite way can also be attractive: Trumpf, the leader in industrial laser technology for many years has started a subsidiary Trumpf Scientific Lasers. As scientists said on the show, the stability and performance of Trumpf laser technology will be a crucial asset for the development of next generation Tera- or Petawatt lasers and they are looking forward to seeing Trumpf lasers arriving in the lab.



Figure 3 The 'Herbert Walther Award 2013' was presented to H. Jeff Kimble (center) by Wolfgang Sandner (left), vice president of the German Physical Society (DPG) and Philip Russel (right) from the Optical Society (OSA). (Photo/Copyright: Messe München GmbH).

Among the debutants at the show, German startup DirectPhotonics gained some attention. Led by a team of industry veterans, they introduce laser diodes with good beam quality ($<10 \text{ mm} \cdot \text{mrad}$) for high power applications.

The World of Photonics Congress

The congress attracted a high level of international attention thanks to its illustrious organizers: the European Physical Society (EPS), the Optical Society (OSA), the IEEE Photonics Society, the European Optical Society (EOS), the Wissenschaftliche Gesellschaft für Lasertechnik (Scientific Society for Laser Technology – WLT) and the International Society for Optics and Photonics (SPIE).

Around 3500 international participants attended the total of six conferences of the Congress with its 2800 lectures and poster presentations. Scientists, students and

users from throughout the world were engaged in lively debate into the evening hours.

One event was the bestowing of the Herbert Walther Award (Figure 3), which this year was conferred on the US scientist Jeff Kimble of the California Institute of Technology (Caltech). The award has existed since 2007 and is considered to be very prestigious: among the previous four prizewinners, the two scientists Serge Haroche and David J. Wineland have since been honored with the Nobel Prize for physics.

In addition to the more traditional presentations in the conference center, the trade show organizers had arranged a significant program of application panels in the halls of the trade fair. Some of those panels reached an outstanding level of quality this year.

www.laser.de