Deliverable 8.8: Communication Kit Final Update

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Declaration: Any work or result described therein is genuinely a result of the HIPERDIAS project. Any other source will be properly referenced where and when relevant

Contents

1 Scope

The HIPERDIAS Communication Kit has been developed to support the effective dissemination of results and findings within the project. This report has been prepared as an update to Deliverable D8.5. It explains how the communication kit has been used to target all different types of stakeholders.
The Communication Kit has been prepared by Modus Research and Innovation Ltd (MODUS) with the support of the Consortium Partners.

2 Introduction

This document is intended to provide a single point of reference that describes the associated aims and objectives of the Communication Kit and how they will be employed throughout the lifetime of the project. The Communication Kit content was designed to be flexible and adaptable to a range of Dissemination requirements. Throughout the project the consortium partners have been encouraged to make recommendations for improvements arising from their utilisation of the various elements of the Kit. The Consortium recognises the importance of communication within a project and has reviewed in detail the Horizon 2020 guidelines on 'Communicating EU research and innovation guidance for project participants'.

3 Aim and Objectives

The 'Aims and Objectives' provide direction and a collective sense of purpose for a project. It is difficult for partners to perform in a productive and coordinated manner on a daily/weekly basis without a clear sense of the purpose of their actions. With aims and goals, Work Package leaders can delegate different roles to partners in achieving shared objectives. The Dissemination and Exploitation Work Package encompasses a broad range of activities and is arguably the most diverse of any Work Package as a consequence of that fact all partners are involved on a local, national and international level through a wide variety of channels.

3.1 Aim

The aim of the HIPERDIAS Communication Kit is 'to provide the necessary tools to effectively disseminate results from the project'.

3.2 Objectives

The Consortium's intentions are to achieve this overall goal by establishing supporting objectives throughout the life of the Project. At the start of the Project, the objectives for the communication kit were as listed below:

1. Develop a HIPERDIAS Brochure.
2. Develop the 1st Newsletter and circulate to relevant stakeholders.
3. Develop future communication tools, depending on the needs of the Consortium.

These initial objectives, were superseded by the following objectives:

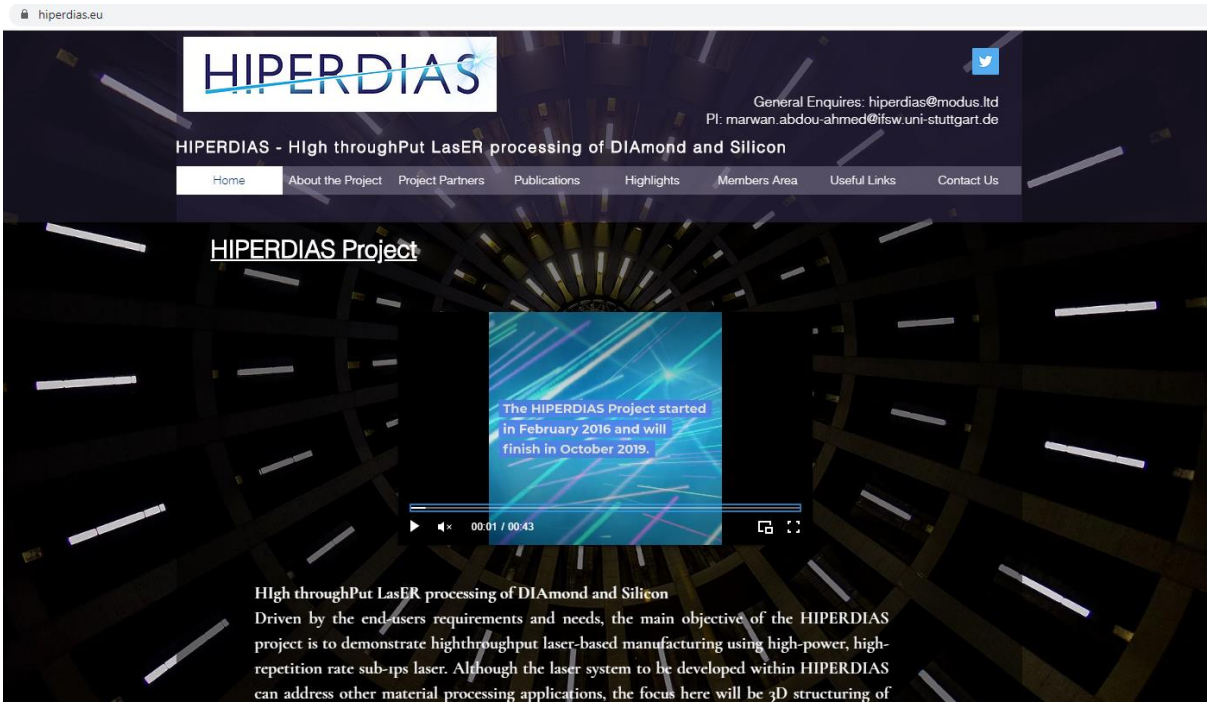
1. Mobilisation of all partners to make specific commitments to the dissemination of HIPERDIAS.
2. Raise awareness of HIPERDIAS at major laser development and laser materials processing events in Europe, North America and Asia.
3. Utilisation of Communication Kit elements as required to support effective communication and dissemination activity. The dissemination activity is accounted for in Deliverable Report D8.7 which covers the final plan for the use and dissemination of HIPERDIAS results.

We have continued to build on the objectives above, and these are detailed in this deliverable D8.8.

4 Communication Kit

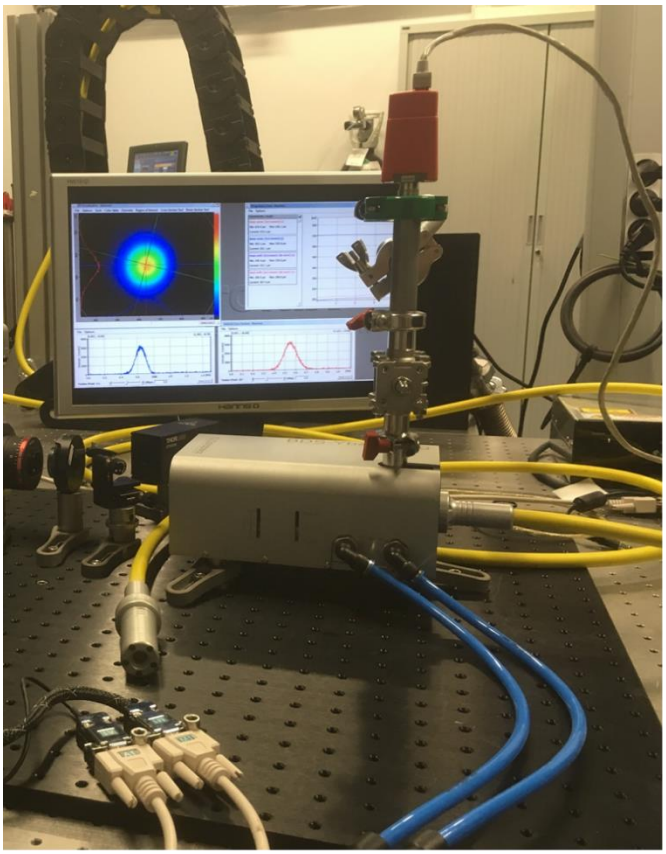
4.1 Social Media

The HIPERDIAS Project has a Project website (www.hiperdias.eu): -

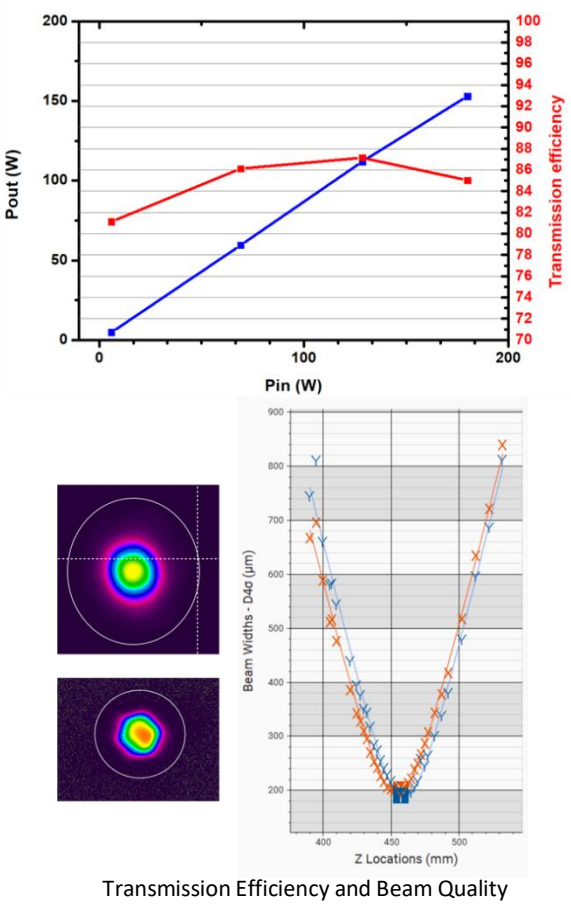


The website gives information about the Project, the Partners involved in the Project, and is where we have uploaded news items such as videos, newsletters, and Project breakthroughs.

17th April 2019. The IFSW has achieved an important milestone, in achieving an average output power of 1 kW with ultrashort pulses of a duration of ~500 fs on their thin-disk multi-pass amplifier.
A 100 W Tangor laser, provided by partner Amplitude Systèmes, served as the seed laser. The integration of the laser system to the material processing machine developed by the partner LASEA, is presently ongoing. The machine will be used to demonstrate 3D ablation of Si and ablation of diamond at kW average laser power in collaboration with the partners Bosch and E6, respectively.
(https://www.hiperdias.eu/single-post/2019/04/17/1KW)

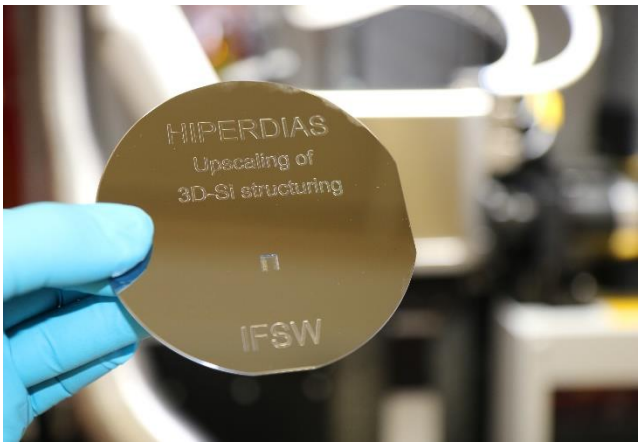


BDS developed EU H2020 HIPERDIAS Project (GA 687880)

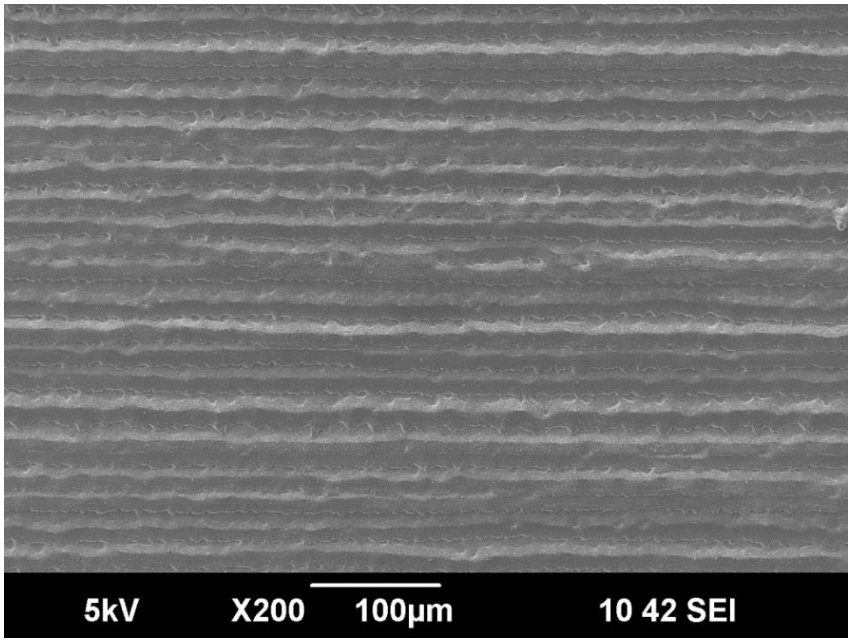


Transmission Efficiency and Beam Quality

20th December 2018. GLOPhotonics, Limoges, France is leading the way in the development and commercialisation of fibre-based Beam Delivery Systems (BDS) for ultra-short pulse high-power lasers used in materials processing applications. Developed by GLOphotonics in conjunction with IFSW, University of Stuttgart during the HIPERDIAS H2020 project (see left-hand picture below) it takes advantage of the unmatched performances of Hollow-Core Photonic Crystal Fiber (HC-PCF) for ultra-short pulse beam delivery. For the first time fiber delivery of 300fs, 150µJ pulses and more than 150W has been reported with close to 90% transmission efficiency and unchanged beam quality (see right-hand pictures above). To achieve such performances GLOphotonics had to develop a fiber sealing method to handle both air non-linearity caused by such high peak power and thermal load induced by multi hundred-watt laser. Jerome Alibert, Chief Executive Officer, is excited by the potential of the technology to help grow the adoption of high-power lasers in micro-machining applications where the delivery of the beam to the work-piece requires the safety and flexibility of fibre delivery: “GLOPhotonics has an opportunity to establish a pre-eminent position in a number of micro-machining applications in the next few years. Ultra-fast lasers with multi hundred-watt average power, are expected to see a significant uptake in the micro-machining market in Europe, Asia and North America and we hope to be amongst the leaders in providing affordable, high performance, safe fibre-based beam delivery systems into this market space”. (https://www.hiperdias.eu/single-post/2018/12/20/Fibre-based-Beam-Delivery-System-BDS-for-ultra-short-pulse-beams)



24th October 2018. There has been important progress at the IFSW (USTUTT) in the development of the laser ablation process of silicon (Si). This latter being one of the main application areas of the HIPERDIAS project. With the successful installation of a 500 W laser system delivering sub-300fs pulses, upscaling activities of the Si ablation process have begun. The goal being to identify processing strategies to achieve a high ablation rate (>1mm³/s) while maintaining a smooth surface (Sa<1 micron). An example of a high-quality Si ablation process is illustrated in the picture to the left.



One of the main challenges that the IFSW (USTUTT) has addressed within the upscaling of the Si-ablation using high-power laser was the heat accumulation effect. This leads to high surface roughness and a darkening effect on the sample. Therefore, the upscaling activities have begun at the IFSW with basic investigations on the residual heat which is a key parameter regarding heat accumulation. In fact, the residual heat gives an indication of the amount of the incident pulse energy that remains inside the material as heat after the ablation process. A publication about this whole study is under preparation by HIPERDIAS partners. On this basis, strategies to avoid a drawback of heat accumulation on the processing result have been identified and Si ablation process at high average power has been successfully implemented. Using a laser beam with 430 W of average power, Si was ablated with an ablation rate of 0.63 mm³/s. The surface quality of the produced samples was good with a roughness measured to be Sa < 2 µm A SEM image of the surface is shown below. With the planned integration of a laser system with 1 kW of average laser power by end of 2018, the HIPERDIAS partners are confident to reach the project goal of an ablation rate of >1 mm³/s. (https://www.hiperdias.eu/single-post/2018/10/24/Important-interim-step-towards-Si-processing-with-a-1kW-ultra-fast-laser-achieved)

12th October 2018. The HIPERDIAS Consortium met last week in Liege for a Consortium Meeting, hosted by partners LASEA. While in Liege the Consortium had the opportunity to update each partner with progress within the project and look towards the future commercialisation of results with an Exploitation Workshop. The marketability of the sub-systems of the HIPERDIAS Project were discussed in detail including seed laser, large area diffraction gratings and fibre beam delivery to define critical metrics which will be further elaborated upon in future Exploitation discussions. The workshop confirmed the positive exploitative value of HIPERDIAS technology and highlighted some immediate opportunities to potentially access further H2020 funding for high TRL close to market propositions through the Fast Track to Innovation (FTI) scheme details of which can be found on the new Funding & Tenders opportunities portal. The Consortium were also given a guided tour through the LASEA Facilities and were able to see the work space where the HIPERDIAS machine was constructed. The Consortium then met in Brussels where they presented the progress of the project in Period 2 to a panel of expert reviewers at the EU Commission. We are pleased to say the HIPERDIAS Project received overall very positive feedback, which highlighted the collaborative spirit of the partners and encouraged the maximum exploitation of the innovative technology being developed within the project. This places the HIPERDIAS Project well in its final year to meet all its goals in the development of high throughput kw class lasers for material processing in a range of applications. (https://www.hiperdias.eu/single-post/2018/10/12/HIPERDIAS-Consortium-Meet-in-Belgium-for-Consortium-and-Review-Meeting)

The HIPERDIAS Autumn Newsletter has arrived

October 3, 2018 | MODUS Research and Innovation Ltd

HIPERDIAS

The first HIPERDIAS Newsletter has arrived. You can find all the most recent news from the project in the newsletter and sign up to our mail list to receive all further newsletters.
Click the link below to view the newsletter.
https://mailchi.mp/66922138027f/hiperdias-...

Read More

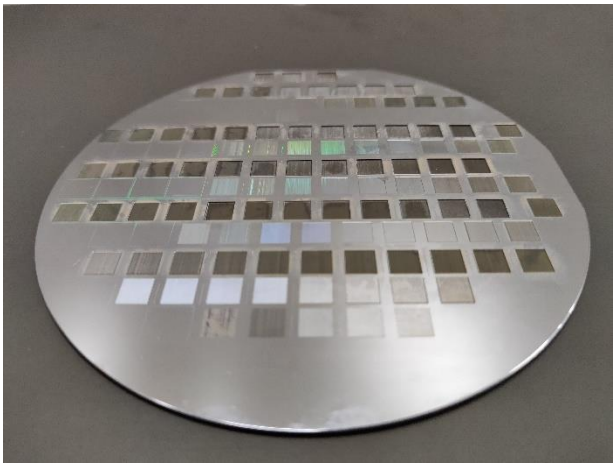
3rd October 2018. The first HIPERDIAS Newsletter has arrived. You can find all the most recent news from the project in the newsletter and sign up to our mail list to receive all further newsletters.
(https://mailchi.mp/66922138027f/hiperdias-autumn-newsletter)

21st September 2019. The HIPERDIAS Project Partners are set to meet in Liege, Belgium on the 2nd and 3rd of October for their 6th Consortium Meeting. The consortium will be hosted by HIPERDIAS Partner LASEA. Since founded in 1999, LASEA have produced high precision, reliable and efficient laser solutions for the laser industry and apply their expertise in many sectors, including high-end watchmaking and fine jewellery production. You can find out more about LASEA on their website by clicking the link here. During the meeting, the consortium will be given a tour of the LASEA Facility (pictured above) and see first-hand the work space in which the machine was built that currently houses the HIPERDIAS high power laser. The Consortium Meeting will also give partners the chance to present and exchange all the progress being made in the Project since the last meeting in Bern, including the integration of the new 200W "seed" laser developed by AMPLITUDE SYSTEMES to drive the Multi-Pass Amplifier developed by the IFSW to Kilowatt levels of average power. A workshop will also be held during the Consortium Meeting to explore the commercialisation and market acceptance of the various elements of the project. The HIPERDIAS Consortium is made up of ten partners across Europe with an extensive range in expertise in high throughput laser processing, all of whom apply their expertise in various sectors and industries. This wealth of knowledge and experience will equip the HIPERDIAS Project with strong prospects in the individual and collective commercialisation of it's technologies. Following the Consortium Meeting, the HIPERDIAS Partners will meet once more in Belgium to present the amalgamation of all work carried out in the second Period of the project to a panel of expert reviewers in Brussels.

As the HIPERDIAS project progresses into the final 12 months of activity, there is a definite convergence taking place of the various technology elements into a complete solution for industry adoption in the future. September 2018 will see a series of evaluation and validation testing milestones achieved that start with the large area, high efficiency diffraction gratings which are in the process of being mounted in place for testing with the high-power laser system at USTUTT. The gratings designed by USTUTT and supplied by AMO are used within the pulse compressor to re-compress pulses to the femtosecond regime after amplification. Another key testing programme that will get underway in September at USTUTT will be the experimental validation (at high average and peak powers) of the high PER (Polarization Extinction Ratio) fibre-based Beam Delivery System (BDS) developed by the University of Limoges (XLIM Research Institute) and produced by GLOPhotonics. In a busy month for the project at USTUTT, September will also feature the integration of the new 200W "seed" laser developed by AMPLITUDE SYSTEMES to drive the Multi-Pass Amplifier developed by the IFSW to Kilowatt levels of average power. Meanwhile at Class4laser Professionals in Switzerland, September will also see the power scaling of the process development work in diamond polishing for Element Six Ltd and the fine cutting of metals. All of this will be taking place at the same time as Si Ablation testing of the LASEA laser machine at USTUTT continues towards the optimisation of targeted ablation rate and surface quality parameters in collaboration with pioneering end-user Robert Bosch. The concentration of these testing activities in September is very timely as the project heads towards its Period 2 Review in Brussels at the beginning of October and establishes a solid platform for the final phase of evaluation and validation work up to the conclusion of the project at the end of July 2019. The prospects for the individual and collective commercialisation and market acceptance of the various elements of the project are strong.

27th July 2018. HIPERDIAS has taken an important step towards the goal of delivering kilowatt-class Ultra Short Pulse (USP) laser materials processing with the installation of a 500W system at IFSW. The IFSW laser integrates a customised Satsuma seed laser provided by AMPLITUDE SYSTEMES and is housed in a machine developed by HIPERDIAS partner LASEA SA. The system delivers pulses of around 300fs and will be upgraded to kilowatt levels with the integration of a new AMPLITUDE SYSTEMS 200W seed in October 2018. In the meantime, process development on the 3D ablation of silicon structures has commenced at the IFSW. The picture below shows first Si ablation trials.

LASEA machine



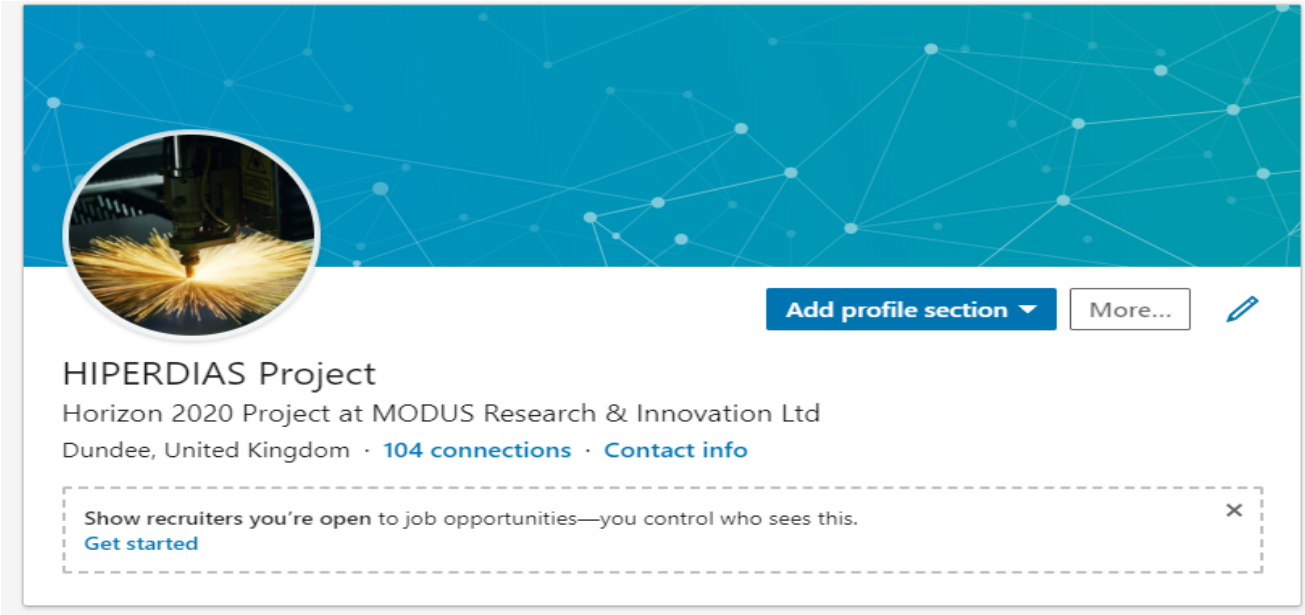
First Si ablation performed with the 500 W USP laser system at the IFSW

HIPERDIAS coordinator, Dr. Marwan Abdou-Ahmed commented on the success to date and the plans for the future: "We are only just beginning to explore the potential of high power USP lasers in materials processing. This success is just an intermediate point on the journey to fully establish the technology for a range of high-value-added applications where the productivity advantaged of high power USP lasers will have a major impact in the industrial setting." (https://www.hiperdias.eu/single-post/2018/07/27/Towards-kilowatt-class-Ultrafast-laser-material-processing)

The Project also has a Twitter account: -

On the twitter account we also upload news about the Project and are trying to capture more of the general publics interest for the Project.

LinkedIn account for the HIPERDIAS Project:-



This platform allows us to connect with more business/industry people, end users etc.

4.2 Presentation Template

This presentation format has been used by all partners to ensure that the Project is being publicized in a consistent manner and to establish the HIPERDIAS brand in the minds of all Stakeholders. The template correctly acknowledges the European Commission and Photonics 21, as it is required to do, and has been extensively used at events detailed in deliverable report D8.7

4.3 Newsletter

Our first newsletter was issued on 3rd October 2018.

HIPERDIAS

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 687880

High throughput LasER processing of DIAmond and Silicon

The first HIPERDIAS Newsletter has arrived!

The HIPERDIAS Project began in February of 2016 and with a duration of 42 Months, will be complete in July 2019. The project has funding from the EU under the Horizon 2020 ICT 2015 call. The HIPERDIAS Project is made up of ten partners across Europe with an extensive range l expertise in high throughput laser processing. The partners include the University of Stuttgart (USTUTT), Amplitude Systèmes SA (AMP), Class 4 Lasers Professionals AG (C4L), Gesellschaft Fur Anwendungsforschung und Entwicklung mit Beschränkter Haftung GMBH (AMO), Robert Bosch GMBH (BOSCH), Université de Limoges (XLIM), Laser Engineering Applications SA (LASEA), GLOphotonics (GLO), Element Six Limited (E6), Modus Research & Innovation Ltd (MODUS).

The project

The HIPERDIAS Objectives:

- Develop a highly flexible high power and high efficiency fs laser source with average output power of up to 1000W at the megahertz (MHz) level including flexible fibre beam
- Create cost effective solutions (power scaling, pulse compression & fiber transport) for a broad range of applications
- Optimization of demanding high volume applications regarding efficiency as well as quality

Website

www.hiperdias.eu

Contact

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Project Manager:
hiperdias@modus.ltd

Highlights

Exciting steps towards kilowatt-class Ultrafast laser material processing!

HIPERDIAS has taken an important step towards the goal of delivering kilowatt class Ultra Short Pulse (USP) laser materials processing with the installation of a 500W system at IFSW. The IFSW laser integrates a customised Satsuma seed laser provided by AMPLITUDE SYSTEMES and is housed in a machine developed by LASEA SA. The system delivers pulses of around 300fs and will be upgraded to kilowatt levels with the integration of a new AMPLITUDE SYSTEMS 200W seed in October 2018. In the meantime, process development on the 3D ablation of silicon structures has commenced at the IFSW.

NEWSLETTER ISSUE 1 | AUGUST 2018 | www.hiperdias.eu

HIPERDIAS

HIPERDIAS Invited to Talk at ICALEO 2018

We are thrilled to announce that HIPERDIAS Partner, the University of Stuttgart IFSW has been invited to talk at The International Congress on Applications of Lasers & Electro-Optics (ICALEO) 2018 organised by the Laser Institute of America about the development of the HIPERDIAS Project's high power, high efficiency laser.

The talk will be given by Christoph Rackoy from the IFSW, and will discuss the development the laser, which is now installed with a 500W system and can deliver pulses of around 300fs, expected to be upgraded to kilowatt levels in October 2018. The results of the SI ablation trials will also be presented.

ICALEO will be held at the Rosen Centre Hotel in Orlando, FL USA from October 14th - 18th. The conference is viewed as one of the premier sources of technical information in the field and draws international laser industry professionals from both academic and industrial settings to exchange ideas in laser materials processing, laser micromachining and nano-manufacturing.

ICALEO

HIPERDIAS Fifth Consortium Meeting in Bern!

The HIPERDIAS Project had its fifth Consortium Meeting in April this year in the beautiful setting of Bern, Switzerland. Members of the consortium first met in Lyon and were given a tour of the C4L Facilities. The consortium then met to present the progress of each Work Package and plan for upcoming Deliverables, Milestones and Tasks within the Project.

The next Consortium Meeting will be held in Liege in October 2018.

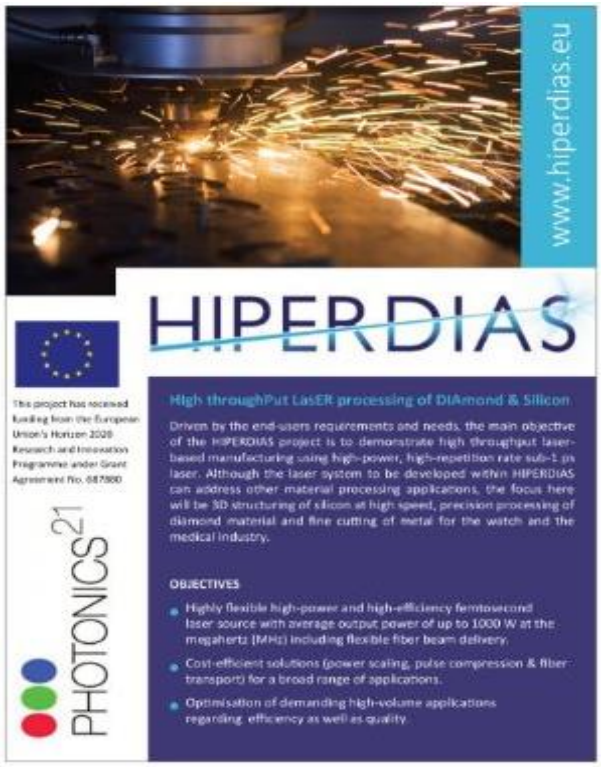
Highlights

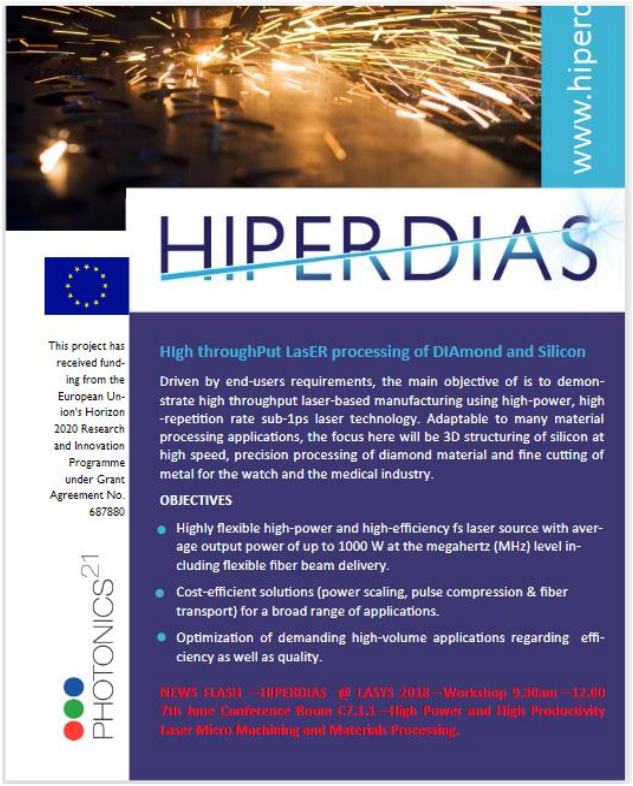
Profile of Recognition for HIPERDIAS Coordinator Dr. Marwan Abdou Ahmed

An excellent article has been specially prepared by the University of Stuttgart profiling the success and achievements of HIPERDIAS Coordinator, Dr. Marwan Abdou Ahmed. The article also shines a light on the HIPERDIAS project and it's role in developing highly efficient disk lasers. You can find the article on the University of Stuttgart website or on the HIPERDIAS website.

4.4 Flyers

We printed flyers for the partners to take with them to conferences to help publicise the Project.





4.5 Pop Up Poster

This pop-up poster was displayed at the Laser Munich Conference in June 2019 to let people know all about our Project.

HIPERDIAS

Project Partners:

1 University of Stuttgart
2 Amplitude Systemes SA
3 Class 4 Laser
4 AMO GmbH
5 Robert Bosch GmbH
6 University of Limoges
7 Lasea
8 GLO Phontonics
9 Element Six Ltd
10 Modus Research & Innovation Ltd

University of Stuttgart
Institut für Strahlwerkzeuge

Applications:

HIPERDIAS is strongly user-driven in order to demonstrate industrial relevance of laser micro-machining at two major reference sites targeting the displacement of the current state of the art mechanical processes with 3D laser processing of silicon, fine cutting of metals and diamond respectively. These challenging applications will draw upon the unique HIPERDIAS proposition:

- It relies on integrating proven laser technology but with a step change in performance over the current state-of-art.
- Building a technological chain by implementing highly innovative photonic components such as new type of micro-structured optical fiber and highly efficient compressor gratings.
- Integrating for the first time fiber delivery that preserves the temporal pulse integrity and handles both record peak power and multi 100W (and up to 1000W) of average power.

Three attractive applications shall be investigated to demonstrate the high-throughput laser-based manufacturing:

- 3D silicon structuring at high-speed
- Precision processing of diamond material
- Fine cutting of metal for the watch and the medical industry

For more information about the HIPERDIAS Project visit our website at www.hiperdias.eu

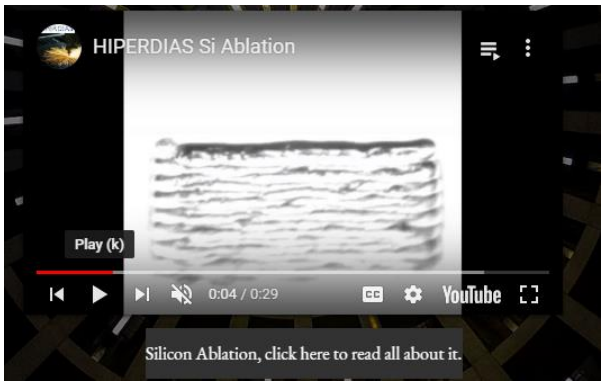
PHOTONICS21
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687880

4.6 Videos

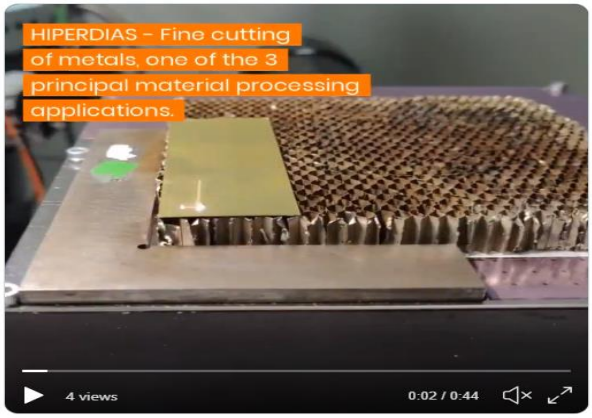
Diamond Ablation Video
https://www.youtube.com/watch?v=eWt9Dl4J-IQ

This video shows laser ablation trials carried out on PCD wafer with a high-power femtosecond laser system (990 W on the workpiece with a minimum pulse duration of 500 fs). The aim of these trials is to reduce the roughness of the top surface of the PCD wafers to the lowest possible, anticipating a 5 times reduction in processing time compared to current methods.



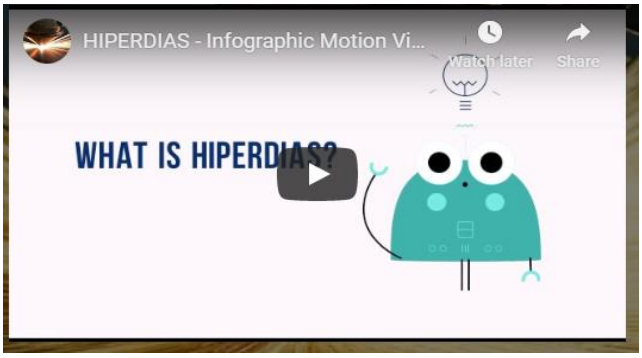
Silicon Ablation Video
https://www.youtube.com/watch?v=akqvhLxHm2g

This video shows the surface of a polished silicon wafer is shown on which a rectangular structure with the footprint of 1x1 mm² is to be ablated with a USP laser. The ablation process can then be seen on a time scale in which the behaviour of the galvo scanner is easily comprehensible and shows a bidirectional scanning strategy. The step by step building up lines correspond to many single ablation events, which form the lines with a certain overlapping. The lines themselves are then arranged with an overlap so that they form full areas in one overscan. One overscan is completed in approximately 20 milliseconds, from overscan to overscan it becomes apparent that the depth of the structure increases. The process parameters applied result in a smooth surface without any deterioration, with an average laser power of about 50 W. Thanks to David Brinkmeier for recording this video as part of his Master's thesis at BOSCH in Renningen, Germany.



Fine Cutting of Metals video
https://www.youtube.com/watch?v=yQYBNnsQdy0

Overview Video – October 2019
https://www.youtube.com/watch?v=z3QROkQGGT8



Intro Video 1 - Feb 2017
https://www.youtube.com/watch?v=QpSEAsYZNtk

Intro Video 2 – Jan 2016
https://www.youtube.com/watch?v=A3FziRpcLB4