

Hub of Application Laboratories for Equipment Assessment
In Laser Based Manufacturing

Editorial

Dear APPOLO newsletter readers,



The APPOLO project has passed half-time with counting successfully executed experiments, analysing delays and reviewing major benefits during the annual review meeting in Madrid last November. The advantages and disadvantages of the open call procedures have been discussed since the accession process of new partners was very protracted.

During the workshop in Burgdorf, Switzerland on “High Throughput and High Precision Laser Micro Machining with Ultra Short Pulses”, approaching mainly: “How to use energy of ultra-shot pulse lasers in precise and efficient ways?”, the results of the APPOLO project have been successfully presented. Special focus has been the optimisation of process quality and ablation rate, setting limits to useful laser pulse energy, repetition rate and beam scanning speed. The knowledge accumulated during the APPOLO experiments shows directions for future developments in ultra-short pulse lasers and beam control.

Over the course of the APPOLO project, partners from BUAS, FTMC, IOM and UPM collected a solid background and expertise on GIGS thin-film solar cell scribing with lasers, including complementary approaches for on-line monitoring during the laser processing. Some initial ideas were rejected as they were not able to provide reliable results with the material variations on large areas. Combining the acquired knowledge, standardised ways for CIGS laser scribing processes have been proposed.

Those two topics were investigated in detail during the equipment assessment tasks, using materials from different end-users and for various applications. Due to the highly competent technical work fundamental knowledge has been provided.

To discuss the future of the APPOLO HUB a dedicated Management Board meeting took place in Berlin at the end of this January. Benefits for partners and customers such as obstacles to extend the APPOLO service beyond the projects duration were observed comprehensively leading to a sustainable model of the APPOLO HUB.

We hope you enjoy this edition of the APPOLO newsletter,

Gediminas Račiukaitis
Project Coordinator

In this Issue

■ Editorial	1
■ Focus Topic – Innofluence creating value from LIFT Technology	2
■ APPOLO Open Call results in new experiments with new partners	5
■ Meet the Consortium	6
■ Centro Ricerche Fiat	6
■ Nanotypos	8
■ Flisom	10
■ Upcoming Events	12
■ The Consortium	15
■ Contacts	15

www.appolo-fp7.eu

Focus Topic

UPM Spinoff “Innofluence” creating value from LIFT Technology

Innofluence S.L. (www.innofluence.es) - is a spin-off of the Universidad Politécnica de Madrid (UPM) incorporated in the second semester of 2015 with the aim of creating value commercializing systems for advanced 3D bioprinting techniques based in laser technology and with key applications in tissue engineering, cell sorting and drug delivery markets. Innofluence was founded by researchers from the Centro Laser of Universidad Politécnica de Madrid in collaboration with laser engineers with a wide experience in the optoelectronic market.



© Innofluence

The business idea was born in the research group Laser Based Advanced Manufacturing of the Centro Láser UPM. This group participates in the FP7 APPOLO project, developing new metallization techniques for the photovoltaic and flexible electronics industry based in Laser Induced Forward Transfer Techniques (LIFT) – one of the project experiments.

This research activity, together with the major goal of the APPOLO project to fill the gap between equipment suppliers and end users in new laser applications using standardized protocols established by research labs, gave rise to the idea of creating a spin-off, whose main target is the equipment development for LIFT applications in biotechnology.

The company will take advantage of the APPOLO project philosophy of validating new applications through specific assessment procedures.

<News<<<News<

APPOLO workshop on High Throughput and High Precision Laser Micromachining with USP

On 4th of November 2015 an APPOLO workshop was held at the Bern University of Applied Sciences (BUAS) in Switzerland. In accordance to the general goal of the APPOLO project, the recent workshop on high throughput and high precision laser micro machining with ultrashort pulses brought together researchers, laser and laser equipment manufacturers as well as integrators and end users. Speakers from APPOLO partners as well as from other companies and research institutes presented and discussed actual demands, physical basics, principal limits and new innovative solutions.

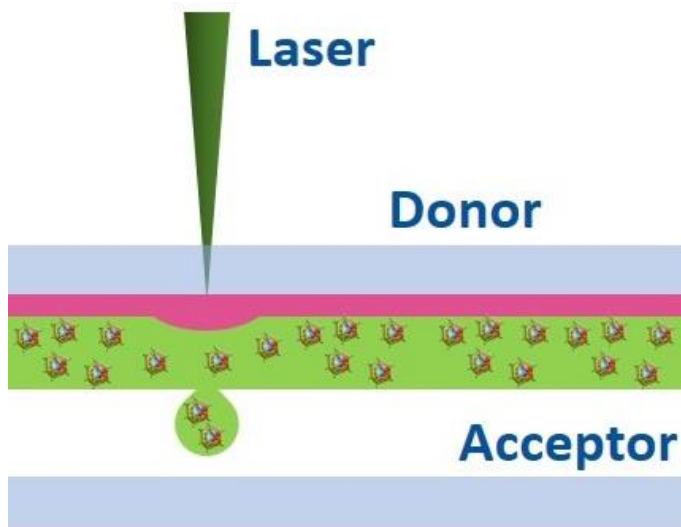


APPOLO Workshop Participants

© Gediminas Raciukaitis

The goal of the workshop was to give an overview about the actual trends and developments in laser systems and equipment for micro machining with ultra-short pulses to encourage the development of new ideas for industrial applications. During the workshop the idea of organizing a summer school on “High Throughput and High Precision Laser Micro Machining with Ultra Short Pulses” came up. More details on summer school will be provided later.

More information about APPOLO Workshop
<http://www.swissphotonics.net/workshops/workshop-datenbank?2213>



Physical principle of cell transfer using LIFT © Innofluence

Even though the activities of the company are not directly related with the experiments of the APPOLO Project, Innofluence is considered a company born under the general vision of laser technology for industry offered by APPOLO.

The goal of the company is to create value from the diverse expertise of the promoters group in the "Laser Induced Forward Transfer" (LIFT) technique in order to commercialize lasers systems specifically designed to produce 3D bioprinting processes, especially high precision cell sorting. In addition, and taking into account that LIFT techniques can deal with almost any material of interest that can be included in a liquid matrix, tissue engineering and drug delivery are two additional interesting application fields.

In fact, the main advantage of LIFT 3D bioprinting is the outstanding resolution of the technique (the technique allows the printing of volumes in the order of picoliters, with spatial resolution in the order of micrometer, instead of the standard nanoliter resolution of ink printing). This is a unique and ground-breaking feature, giving the technique an additional market opportunity due to its potential complementarity with other techniques for tissue engineering such as ink-jet or extrusion printing.

The Innofluence business deployment strategy in a very preliminary phase is to penetrate into the market as an advanced supplier for specialized equipment for research labs focussed on final applications development.

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OneFive responses to increasing demand by relocating to larger facility in Regensburg

The high amount of orders and increasing demand for ultrafast laser technology has driven the company OneFive to relocate their facility to a different building in Regensburg.

The new facility, a few kilometers apart from the old building, is supposed to help optimize the efficiency of the company's production lines.

Beyond the mere size, the growing staff of scientists, engineers and researchers are getting access to a top-of-the-art research and development facility with class 10000 and 1000 cleanrooms equipped with water and gas processing equipment.



One5 new location

© One5

Source:

http://www.industrial-lasers.com/articles/2015/11/ultrafast-laser-manufacturer-onefive-relocates-operations.html?cmpid=Enl_ILS_Dec-3-2015&eid=306470005&bid=1247594

Most of the research labs working in this field are interested in laser based bioprinting techniques, but the highly specialized knowledge inherent to these processes is a fundamental barrier for implementing the systems in laboratories with an inadequate background in laser technology.



Innofluence co-founders

© Innofluence

Innofluence will use its experience, and the assessment experience developed during the APPOLO project, to offer a highly customizable laboratory system in which most of the parts needed for a successful development of the process, e.g., laser control and laser-matter knowledge, will be integrate as software and hardware into the equipment, offering a highly friendly environment for working.

Currently the company is actively looking for partnership and participation in different national and European projects, and has started its commercial activity offering services in process engineering, process parameterization, and service and support in the field of laser technology for bio applications.

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Mondragon Assembly opens new production plant in Mexico

Mondragon Assembly has reached a new milestone in its international expansion strategy with the opening of a new plant in Mexico.

Increased orders in recent years have led to the need for Mondragon Assembly to build this new plant, to meet its customers' needs.

The recently constructed factory building is located in El Marqués in the state of Querétaro and has a surface area of 4100 m², including a 3000 m² shop floor area.



MONA Facility Mexico

©MONA

This new plant has enabled Mondragon Assembly to become established as one of Mexico's leading special machinery and solar power equipment manufacturers.

Source:

<http://www.mondragon-assembly.com/en/news/824-mondragon-assembly-opens-its-new-mexico-plant>

APPOLO Open Call 2015 results in 7 new experiments with 14 new partners

From January 12th to March 18th, 2015 APPOLO launched an open call for new laser assessment experiments with a foreseen budget of around 1.2 mio €. The expected duration of participation was thereby determined from July 2015 to August 2017.

The execution of the open call resulted in following seven new assessment projects:

- **FAST:** Fast and Accurate Scanning for micro-milling of low friction surface Textures, laser texturing for bearings
- **PONT:** Polymer NIR Laser Resonance Texturing
- **LANDRUM:** Laser patterning of DRUM-moulds for large-area nano-imprinted polymer films, texturing rolls for nanoimprint
- **NEW-DELI:** A new fibre-based delivery system for pulsed laser beams, Kagome fiber delivery of ps laser radiation
- **FastGALVO:** Ultra-fast galvo-scanners for laser micromachining, texturing and hole opening with fast galvoscanners
- **DECOUL-Cr:** New Ultrafast Laser equipment for Decorative finishing in automotive Chrome plated parts, direct decorative texturing for automotive parts
- **SUN-JELL:** Novel SUB-Ns system assessment for Jewellery and Luxury fine marking and engraving Laser applications, lasers for gold goods marking

During the open call several (14) new partners have been acquired for within APPOLO project. The new partners are presented in the following:

Partner	Country	Project Involvements
SCANLAB AG	DE	FAST; LANDRUM, FAST_GALVO
SKF B.V.	NL	FAST
LaserSpec	BE	PONT
OSAI Automation Systems SPA	IT	PONT
It4ip	BE	PONT
Nanotipos	GR	LANDRUM
IRIS SRL	IT	NEW-DELI
OPI Photonics SRL	IT	NEW-DELI
Robert Bosch GmbH	DE	FAST-GALVO
Alstom/ General Electric (Switzerland)	CH	FAST-GALVO
MAIER S.Coop.	ES	DECOUL-CR
LASING,S.A	ES	DECOUL-CR
SISMA LASER	IT	SUN-JELL
LAC S.p.a.	IT	SUN-JELL

Meet the Consortium



**CENTRO
RICERCHE
FIAT**

© CRF

Centro Ricerche Fiat (CRF) headquartered in Orbassano (Turin) with other branch sites in Italy, was established in 1978. As a focal point for research activities of FCA (Fiat Chrysler Automobiles), CRF has the mission to:

- Develop and transfer innovative powertrains, vehicle systems and features, materials, processes and methodologies together with innovation expertise in order to improve the competitiveness of FCA products;
- Represent FCA in European collaborative research programs, joining pre-competitive projects and promoting networking actions;
- Support FCA in the protection and enhancement of intellectual property.

Also through the cooperation with a pan-European and increasingly global network of more than 1700 partners from industry and academia, CRF conducts collaborative research initiatives at the national and international levels in partnership with all the key public and private stakeholders concerned with sustainable mobility, targeting specifically the industrial exploitation of research. The CRF research activities imply strategic competences not only in the field of automotive engineering, but also in the fields of manufacturing, advanced materials, ICT and electronics, as well as a wide range of state-of-the-art laboratories and extensive test facilities, including advanced engine & vehicle testing facilities, EMC chambers and a dynamic driving simulator with immersive virtual reality.

Interview...

...with Dr. Nello Li Pira, Head of Functional Surfaces & Optical Assessment group at Centro Ricerche Fiat (CRF)

What are the biggest challenges in the field of laser-based manufacturing today?

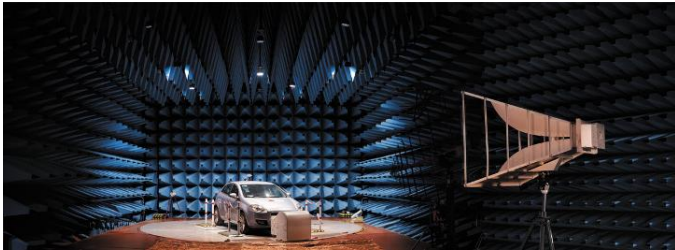
Great advancements in vehicle integration of electrical architecture and styling direction (by laser engraving of the plastic moulds) have driven the development of the major car makers in the last years.

Electrical architecture dependent on the OEM novel styling and integration strategies, as for example the novel central control board with several menu operations, are offered. In addition, being able to combine the functions of menu operation, climate control, and so on into a single plastic part, presumes a reduction of costs and complexity. The MID (Molded Interconnect Devices) technology based on laser treatment of the surface can reduce the number of components, manufacturing phases (assembly) and miniaturization.

Due to its advantages in efficiency and high degree of design freedom, laser texturing allows the production of a variety of different shapes and geometries (texturized, engraved, microstructured, etc). Potentially the implementation of laser technology within the component manufacturing will support the introduction of MID components in the vehicle coming from suppliers (Tier1, Tier 2).

To which extent can APPOLO help to face those challenges?

One of the objectives of the FP7 project is to support European competitiveness by producing knowledge and scientific excellence through general cooperation. The introduction of novel industrial approach needs strong collaboration and it is recognized that international cooperation in science and technology can overcome these issues. Development of novel laser sources as well as the implementation of laser irradiation and treatment onto automotive plastics is one of the major aims of the proposal. The strong cooperation is needed to meet all the requirements in term of materials, chemicals, laser, electronics and integration as well.



Testing Facility at CRF

© CRF

CRF participates with a leading role in the European “Green Vehicle Initiative” and “Factories of the Future”, the Public Private Partnerships conceived by the European Commission in 2009 to focus public and private research on issues of direct and significant relevance to the Europe with regard to the competitiveness of industry and employment. Within this context, CRF is actively involved in key European Technology Platforms including: ERTRAC (road transport), EPOSS (smart systems), EUMAT (materials), MANUFUTURE (manufacturing), each of which has proved to be particularly effective at bringing together key stakeholders within an integrated approach to research and innovation. CRF is also supporting the Joint Technology Initiative ECSEL (Electronic Components and Systems for European Leadership).



CRF Logo

© CRF

The Intellectual Property developed by CRF includes a total of 2573 patents, both granted and pending, protecting 592 inventions. Over recent years the technology-driver role of CRF has enabled the industrialization and commercialization of a significant number of distinctive and highly innovative products for

FCA The role of CRF in the APPOLO project is mainly concerning with definition of the specification of automotive market and testing of materials (polymers and additives) in terms of surface and interface analysis. Design of vehicle component (e.g. instrument panel within dashboard) and final assessment of the demonstrators will be carried out, evaluating introduction of laser treatment process within automotive market and supplier's value chain.

<News<<<News<

APPOLO Project Video introduced

The APPOLO project video introduction has been released on the APPOLO-Website (<http://www.appolo-fp7.eu>).

As a brief description of the APPOLO project idea and service provided, the short clip shows it's objectives and main goals. It may function as marketing material in order to introduce the basic tasks and services of the APPOLO HUB to potential customers and interested people. The short film's general focus is on breaking down the idea of the hub and its benefits for clients in a comprehensible way. Thereby, the general principle of ultra-short-pulse (USP) lasers is explained, essential advantages are outlined and possible applications are shown. Moreover the key technological components of USP lasers are introduced and the difficulty of their process interaction is roughly described.



APPOLO Project Clip

© APPOLO

See the clip in full length under:
https://youtu.be/Q_Za-atlYLg

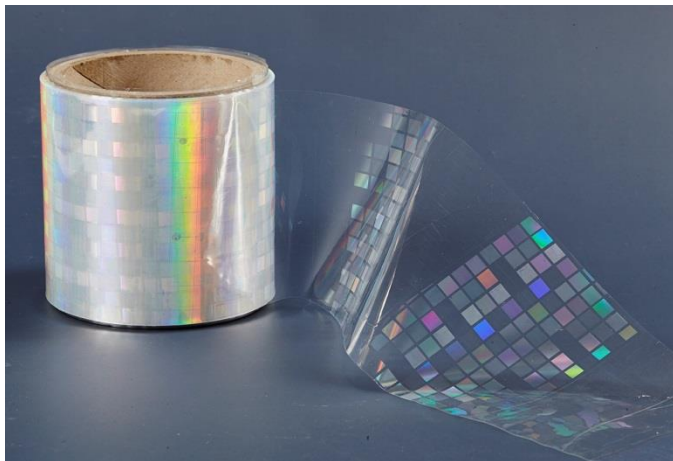


Nanotypos

ADVANCED
NANOMANUFACTURING

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Nanotypos is a pioneering research and technology development company whose mission is to create, develop and commercialize products that are realized by means of roll-to-roll nanoimprint lithography nano-manufacturing processes. Nanotypos produces micro/nano structured surfaces enabling added value products and intelligent functionalities including photonic devices, optical components, high security holograms, bio-inspired surfaces, bio-sensor platforms, micro-fluidic devices and appliance for a large variety of technologies.



© Nanotypos

What was the initial problem?

Continuous transfer of micro/nano-patterns onto flexible substrates is a promising technology for mass production of customized plastics, flexible electronic products such as bendable displays and foldable solar cells, as well as functionalized fabrics. There has been a great deal of research on nanoimprint lithography (NIL), based on rolls, as a fast and effective technology for patterning on plastic substrates with low costs and high throughput. The main bottle neck of roll to roll nanoimprint lithography (R2R NIL) is the manufacturing of continuous (without any seam) moulds. Apart from the benefit of having no boundary issues, the overall time needed to fabricate such moulds makes the overall process very promising from the industrial point of view.

Interview...

...with Costas Kechagias, director of communication at Nanotypos

What are the biggest challenges in the field of laser-based manufacturing today?

As we see it, there are two main challenges that have to be tackled. First, the realisation of highly defined hierarchical structures on a cylindrical mould without stitching effects and secondly the improvement on production speeds and costs for permitting a viable industrial assessment.

To which extent can APPOLO help to face those challenges?

The APPOLO project will yield high impact in terms of product development by ensuring early stage engagement of all necessary stakeholders. High skilled personnel and state of the art equipment will facilitate to face such challenges.

The HUB fosters collaboration between academic and industrial groups. This ensures an effective technical transfer of know how between the academic and industry partners and provides a model for future engagements. Within the project both academic and industrial involvement allows efficient technology transfer planning.

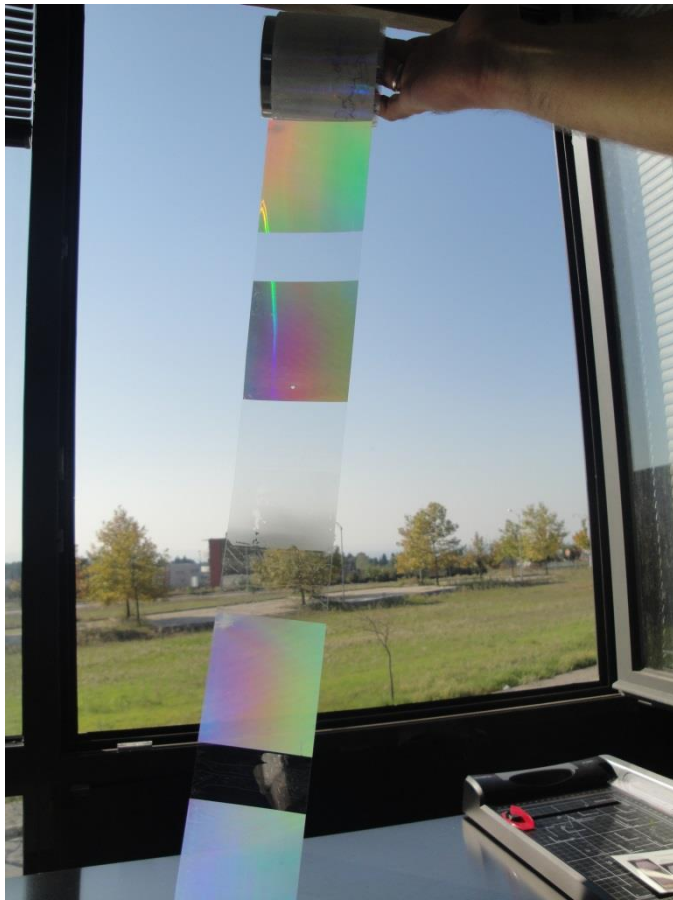
The opportunities to get access to established and high level infrastructures is an effective way of allowing SMEs to be engaged with state of the art manufacturing technologies and minimize the high risks of complex developments. Collaborative projects with multidisciplinary backgrounds could foster significant progress in advanced manufacturing technologies enabling EU competitiveness at a high global level.

How do you solve it?

One way of solving this problem is to use precise and high-resolution lithography techniques combined with state of the art equipment. In particular within the LADRUM project we are using a high-power ps-laser source combined with fast scanning and beam splitting

technology for direct writing of micro-patterns onto a metal drum-mould.

LADRUM aims at helping EU manufacturing enterprises to meet the increasing global consumer demand for high-quality, functional and safe products through the optimization of micro-replication processes, based on laser engraving and roll-to-roll nanoimprint lithography, in combination with novel materials.



© Nanotypos

It is critical for the economic viability and competitiveness of Europe to efficiently move leading-edge research from the lab to the real world. Lots of interesting work, in terms of miniaturization, has been done at laboratory level but still much have to be done to transfer these findings into real products. Nanotypos vision is to translate success in the laboratory to success in the global marketplace utilizing advanced manufacturing technologies.

LADRUM objective is to develop a manufacturing chain based on laser engraving and R2R nanoimprint lithography technologies.



© Nanotypos

Our targeted industrial applications are within the fields of automotive industry, packaging industry, bio-medical and biotechnology industry and the security printing industry. The main objectives of the project are:

- Defining of hierarchical micron patterns and their fabrication procedure for effective laser patterning AND high functionality for applications
- Adaption of laser writing with ultrashort laser pulses into a two-step process for the fine and the coarse patterning with high efficiency
- Verification of the laser-written hierarchical surface structures on cylinders for NIL patterning in a roll-to-roll process.

<News<<<News<

EKSPLA announces new tuneable wavelength femto-second system

UltraFlux is the first compact high energy femtosecond laser system which incorporates the advantages of ultrafast fiber laser, solid-state and parametric amplification technologies in a small box. The systems approach greatly simplifies the system – excludes femtosecond regenerative amplifier and eliminates the need of pump and seed pulse synchronization. Furthermore the contrast of the output pulses is potentially increased.

Find full press release at:
<http://www.ekspla.com/news/new-tunable-wavelength-femtosecond-system.html>



©FLISOM

Flisom, a Swiss company based near Zurich, was founded in 2005 as a spin-off of the Swiss Federal Institute of Technology Zurich (ETHZ) and is currently completing its first pilot line to manufacture flexible and lightweight solar modules based on a roll-to-roll, co-evaporation CIGS semiconductor deposition process. As of 2016, Flisom has over 60 employees.

From a technology transfer and business standpoint, Flisom and its founders have received several technology- and business-related awards, including independently verified world records for photovoltaic conversion efficiency for solar cells on plastic foils with ETHZ and the EMPA Materials Science and Technology Institute. Since 2009, Flisom's strategic investor is the Tata Group.



© FLISOM

Flisom is working towards the commercialization of next-generation flexible solar modules designed for several markets: building photovoltaics (BAPV, BIPV), mobile devices (phones, laptops, bags, apparels) and vehicles (cars, ships). Flisom's expertise is in the development and production of high efficiency flexible solar modules, which includes the field of thin-film deposition on polyimide and all deposition stages, laser scribing stages, back-end stages and testing at various production stages. Main activity in the past years was technology transfer of flexible CIGS solar cells from lab to production.

Interview...

...with Dr. David Bremaud, Director of R&D Projects at Flisom

What are the biggest challenges in the field of laser-based manufacturing today?

In the manufacturing of flexible solar modules, like for any other high tech products, production processes are required that combine reliability with high throughput.

For the laser scribing of solar modules it is important to completely remove single layers without damaging the underneath layers. Therefore the processing parameters window is rather small and results in high demands to the laser in terms of stability and reliability.

Since the flexible solar modules are produced by roll-to-roll, the positioning on a continuous moving web is quite tricky and requires high precision to minimize dead areas and therefore maximize the conversion efficiency of the complete solar module.

To which extent can APPOLO help to face those challenges?

APPOLO project brings together laser manufacturer, reference laboratories and end-users like us. The lasers can be tested without disclosing too much sensitive process details and the laser manufactures can optimize their products for our specific applications.

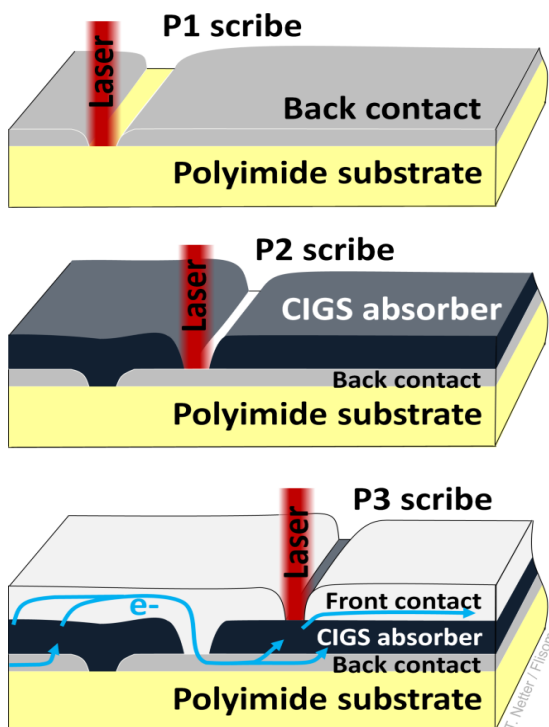
By having the HUB, laboratories with accumulated knowledge and specialized infrastructure, performing these tests and improving the processes, the interaction between researchers and end-user is initiated and accelerated.

Flisom's core competencies in manufacturing of thin-film flexible solar modules are:

- Development of roll-to-roll manufacturing systems for CIGS thin-film deposition using co-evaporation processes,
- Development of CIGS deposition processes specially adapted to roll-to-roll manufacturing,

- Development of laser scribing processes for roll-to-roll manufacturing of monolithically-interconnected flexible solar modules,
- Development of encapsulation and lamination technologies for CIGS solar modules
- Design of flexible solar modules
- Industrial scaling up and technology transfer of thin-film know-how from laboratory research

One of the main features of Flisom's flexible solar modules is the monolithical interconnection, which connects solar cells in series to a solar module. The solar cells interconnection is illustrated in the diagram below. P1 is the first patterning step, which is the separation of the electrical back contact. The second step (P2) allows the electrical connection between the cells, while the third patterning step (P3) isolates the electrical front contact layer. Repeating this patterning structure several times will then create a solar module. The patterning structures are performed with laser scribing.



© FLISOM

Within the APPOLO project, Flisom specifies thin-film solar modules and project performance goals and gains with respect to laser scribing. Flisom also supplies solar modules for laser scribing tests and then characterizes and evaluates the laser-scribed devices.

<News<<<News<

APPOLO Partners participated at SPIE Photonics West 2016

From February 13th until 18th, 2016 the APPOLO project is represented at the world's largest international event encompassing industrial and medical applications of optics, lasers, and photonics. APPOLO partners hold following presentations:

- **A. Burn (BUAS), et al.**
"High throughput laser scribing of Cu(In,Ga)Se₂ thin-film solar cells"
- **A. Michailovas (EKSPLA), N. Rusteika (EKSPLA, FTMC), et al.**
"Efficient ultrafast fibre laser using chirped fibre Bragg grating and chirped volume Bragg grating stretcher/compressor configuration"
- **D. Munoz-Martin (UPM), et al.**
"Characterization of transfer regimes of high-viscosity silver pastes printed by LIFT"
- **V. Markovic (Lumentum), et al.**
"100W class compact Yb:YAG single crystal fibre amplifier for femtosecond lasers without CPA"
- **B. Resan (Lumentum)**
"Hybrid high power fs lasers"
- **K. Ratautas (FTMC), N. Li Pira (CRF), S. Sinopoli (BIOAGE), et al.**
"Laser-induced selective copper plating of polypropylene surfaces"

Following APPOLO partners have been exhibiting at Photonics West 2016:

- ELAS booth # 4566
- NextScan Technologies booth #2317 South Hall
- Ekspla booth # 1533
- Onefive booth #8514, BiOs
- Onefive booth #5254, Photonics West
- Lumentum booth #2017 South Hall

Source:

<http://www.appolo-fp7.eu/news.html>

Upcoming Events 2016

25.04. – 29.04.	Hannover, Germany	Hannover Messe
17.05. – 19.05.	Yokohama, Japan	2 nd Smart Laser processing conference
23.05. – 27.05.	Xi'an, China	7th International Symposium on Laser Precision Microfabrication
31.05. – 02.06.	Stuttgart, Germany	LASYS 2016
31.05. – 02.06.	Stuttgart, Germany	Automotive Interiors EXPO 2016
21.06. – 24.06.	Munich, Germany	EU-PVSEC 2016 / InterSolar Europe
29.08. – 02.09.	Brasov, Romania	ICPEPA 2016
19.09. – 22.09.	Fürth, Germany	LANE



© Hannover Messe

The **Hannover Messe** will take place from the 25th until the 29th of April 2016 in Hannover, Germany.

The exhibition is a meeting spot for the high tech branch all over the world, whereas the illustrated topics vary widely. "From individual components to the complete intelligent factory, as well as topical trends such as energy efficiency, lightweight construction and additive manufacturing – at HANNOVER MESSE you'll get a complete picture of the industrial value-adding chain under one roof - in Hannover and worldwide."

<http://www.hannovermesse.de/home>

SLPC 2016

The **2nd Smart Laser Processing Conference** will take place from May 17th until 19th, 2016 in Yokohama, Japan.

The conference is planned as a three-day event consisting of a plenary session, an oral sessions and a poster session. The conference mainly aims to provide a forum for discussion on fundamental aspects of laser-matter interaction, the state-of-the-art of smart laser processing, and topics for the next generation with fundamental scientists, end users and laser manufacturers.

The topics discussed range from plain cutting and welding over additive and functional surface manufacturing to short wavelength application and micro nano-processing.

<http://www.jlps.gr.jp/slpc2016/>

<News<<<News<

OneFive among the finalists for the PRISM Award

Every year the industry awards the most innovative optics and photonics products at the Photonic West Exhibition and Conference. Potential prize winning products are divided into 9 main categories. In each category one special product will be chosen.

Within the industrial laser category the APPOLO partner OneFive has been selected to be among the finalists of the 2016 PRISM Award. Their Katana 06 HP was able to prevail against the fierce competition at Photonics West due to its tuning ability and super high resolution. *"Primarily aimed at super-resolution microscopy applications, the picosecond source from OneFive represents the first high-power, alignment-free ultrafast laser to function in the orange spectrum. Tunable between 556 and 660nm, the Katana delivers an average power of 1W with pulse durations down to 30 ps"*

The winners of the PRISM Award 2016 in 9 categories:

- Additive Manufacturing:
LUXeXcel with Printoptical Technology
- Biomedical Instrumentation:
Bacterioscan with Laser Microbial Growth Monitor
- Detectors and Scanners:
Hamamatsu with Micro-spectrometer
- Imaging and Cameras:
Seek Thermal & Ratheon with Seek Thermal Camera
- Industrial Lasers:
IPG Photonics with GLPN-500-R
- Materials and Coatings:
Inrad Optics with Stilbene Single Crystals
- Optics and Optical Components:
Intel Corning & US Conec with MXC Connector
- Other Metrology Instruments:
WITec with RISE Microscopy
- Scientific Lasers:
Fianium with WhiteLase SC400-20

Source:

ShowDailyPhotonicsWest1602;

<http://www.photonicsprismaward.com/winners.aspx>

LPM 2016

The **17th International Symposium on Laser Precision Microfabrication (LPM 2016)** will take place from Mai 23rd to 27th, 2016 in Xi'an, China.

LPM is the world's number one meeting of the laser user community where the most advanced developments and recent trends in laser application for fine and precise fabrication of diverse materials are discussed between industry, research and academia.

The symposium provides unique opportunities for researchers all over the world to discuss matters from a variety of different subject specific theme areas.

<http://www.lpm2016.org/>



Internationale Fachmesse für Laser-Materialbearbeitung

© LASYS

The **LASYS International Trade Fair for Laser Material Processing** will take place from May 31st until June 02nd, 2016 in Stuttgart, Germany.

"LASYS is the ideal platform for special applications, new fields of application, as well as industry trends and innovation" within the laser processing branch. As the only international trade fair with clear focus on system solutions LASYS shows the entire application scope of lasers, covering a comprehensive range of laser applications across different industries and materials.

<http://www.messe-stuttgart.de/en/lasys/>

automotive interiors EXPO 2016

© Automotive Interior Expo

The **Automotive Interiors Expo 2016** will take place from May 31st until June 2nd, 2016 in Stuttgart, Germany.

The exhibition shows a wide range of fabrics, acoustical materials, shape-forming materials and foams, fasteners, adhesive systems and lighting used for vehicles interior equipment. In 2016 the surface modification of different materials gains special focus.

"The show is a must-visit for Tier 1 and Tier 2 suppliers as well as for interior design teams from car manufacturers wanting to keep up with the rapidly changing world of materials, finishes and technologies that contribute to 'touch and feel'.

<http://www.automotive-interiors-expo.com/english/>

ICPEPA-10

The **10th International Conference on Photo-Excited Processes and Applications (ICPEPA)** will take place from August 29th to September 2nd, 2016 in Brasov, Romania.

The topics range from fundamental laser-material interactions, theory and modeling to applications with nanoparticles and nano-photonics as well as new trends in photo excitations. The conference intends to create an atmosphere for scientific presentations at the forefront of the field and an informal exchange of ideas in a relaxing environment.

<http://icpepa10.com/>



The **InterSolar Europe Exhibition and Conference 2016** will take place from June 21st to 24th, 2016 in Munich, Germany.

With events spanning four continents, today InterSolar is the world's leading exhibition for the solar industry and its partners. Our objective is to increase the share of solar power in the energy supply.

By providing first-rate services, our exhibitions and international conferences bring businesses, technologies and people from the most important markets around the globe together. We have more than 20 years of experiences in opening up markets, providing specialist knowledge and creating links: Connecting Solar Business!

<http://www.intersolar.de/en/for-visitors/about-intersolar/intersolar-europe.html>

LANE 2016

The **9th International Conference on Photonic Technologies** will take place on September 19th to 22nd, 2016 in Fürth, Germany.

Modern research has to act on social, economic and environmental developments to provide solutions for the existing and upcoming global challenges. To meet this challenge, LANE 2016 offers a platform for an international exchange of ideas, opinions, perspectives, results and solutions concerning photonic technologies.

<http://www.lane-conference.org/>

Consortium



<http://appolo-fp7.eu/>



Coordinator

State research institute Center for Physical Sciences and Technology (FTMC)

Department of Laser Technologies
Savanoriu Ave. 231, LT-02300 Vilnius, Lithuania

Tel.: +370 5 264 9211, 266 1640/1643,
Fax: +370 5 260 2317

Contact Person

Dr. Gediminas Račiukaitis

Head of Department of Laser Technologies, FTMC

Tel.: +370 5 264 4868

E-Mail: graciukaitis@ar.fi.lt

