LECTURE DAY at INFLPR

Date:	16 April 2018
Place:	National Institute for Laser, Plasma and Radiation Physics Magurele 077125, Ilfov, ROMANIA
Location:	National Library of Physics / Bibioteca Nationala de Fizica, IFIN-HH (in the INFLPR)

- PROGRAMME -

- 16 APRIL 2018 -

09:00 - 09:30 Registration and Coffee

09:30 - 09:45 **Welcome. Introduction**
Nicolaie PAVEL, Dr. INFLPR, Bucharest, Romania

09:45 - 10:45 **Application of Optical Measurement Techniques for the Characterization of the Laser Ignition Process**
Mark BARWINKEL; University of Bayreuth, Bayreuth, Germany

10:45 - 11:00 Coffee break

11:00 - 12:00 **Laser Ignition in Aeronautical Applications**
Laurent ZIMMER, Prof. Dr.; CNRS, Laboratoire EM2C, CentraleSupélec, Université Paris-Saclay, France

12:00 - 13:30 Lunch

13:30 - 14:30 **High Temperature Suitable Bonding Technologies for Miniaturized Optomechanical Systems - Semiconductors, Crystals, Fused Silica, Ceramics and Metals Integrated in One Package**
Erik BECKERT, Dr.; Fraunhofer IOF, Jena, Germany

- END OF LECTURES -

14:45 - 15:30 Laboratory Tour: Plasma Coating Group (http://www.plasmacoatings.ro/)

- END OF THE PROGRAMME -

Mark BÄRWINKEL
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Application of Optical Measurement Techniques for the Characterization of the Laser Ignition Process

Abstract Recent studies show that laser ignition is able to improve the engine efficiency and the cyclic variations while, at the same time, reducing the pollutant emissions. However, to exploit the full potential of the laser ignition, the mechanisms and the characteristics of the ignition process have to be known. The laser ignition process can be examined by optical measurement techniques. With these tools, a better understanding of the laser ignition process can be achieved. Therefore, the lecture introduces several techniques to characterize each step of the laser ignition process. The energy transfer from the laser to plasma, the plasma development and evolution, the shockwave propagation as well as the flame kernel development and propagation are involved in the laser ignition process. In part self-developed but also measurement techniques applied in the literature to characterize these processes are treated.

Mark BÄRWINKEL studied energy science and technologies at the University of Bayreuth, Bayreuth, Germany. He received an MSc degree in 2014, with thesis "Analysis of pulse train ignition with passively Q-switched lasers". Since June 2014, he is a research assistant at the LTTT with the emphasis on laser ignition. Current work focuses on the influence of laser and focusing parameters on the laser induced breakdown and ignition process. Investigations are carried out using an end-pumped passively Q-switched laser ignition system with variable in-coupling geometry and (variable) focusing unit.

Prof. Dr. Laurent ZIMMER
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Laser Ignition in Aeronautical Applications

Abstract Ignition of sprays remains an important issue for aeronautical applications. The final faith of an attempt strongly depends on local conditions (positions and sizes of droplets as well as velocities). It is therefore important to develop measurement techniques able to describe plasma properties as well as spray features. In this talk, two specific techniques will be described. A 2D-Laser Induced Plasma Spectroscopy will be presented, showing the feasibility as well as constraints of single shot measurements within laser induced plasma. A second technique, aiming at measuring the time-resolved 3D dynamics of sprays will be discussed and its current limitations are shown. Typical applications of those measurement techniques in Laser Induced Spray Ignition will be described.

Laurent ZIMMER. After completing his PhD in the von Karman Institute (Belgium), Laurent ZIMMER was a research fellow at the Japan Aerospace Exploration Agency for 6 years. Since 2007 he is a CNRS researcher in CentraleSupélec. His main research topics are the development of measurement techniques to plasma and spray applications as well as post-processing methods to infer fluid mechanics dynamics from measurements or numerical simulations. His application field covers both aeronautical applications as well as land-based power stations.

Dr. Erik BECKERT
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High Temperature Suitable Bonding Technologies for Miniaturized Optomechanical Systems - Semiconductors, Crystals, Fused Silica, Ceramics and Metals Integrated in One Package

Abstract Bonding technologies for complex optical and optoelectronic systems often have to serve harsh environmental conditions, such as high or low temperatures and steep temperature gradients, high humidity, high mechanical or radiation loads, vacuum conditions and more. Such conditions result in stringent requirements for the long term stable fixation of components, which poses particular challenges for optics - heterogeneous materials integration, miniaturization, micron stability and low induced stress. The talk will focus on various technologies that allow for the bonding of typical optical materials such as glass, metals, ceramics, glass-ceramics and crystals, either using intermediate layers composed of polymer based glues, anorganic-metallic soft solder alloys or amorphous glasses, or preventing any intermediate layer by applying direct bonding technologies. Application examples cover laser-optical assemblies for various needs, such as sensors, quantum communication, and laser based ignition.

Erik BECKERT obtained a diploma in precision engineering in 1997 and a PhD in optoelectronics system integration in 2005, both from Ilmenau Technical University, Germany. Since 2001 he has been working at Fraunhofer Institute for Applied Optics and Precision Engineering (IOF), where now he is a group leader for micro assembly and system integration. His research interests cover, besides assembly and packaging of miniaturized systems, also printing of functional materials and structures as well as quantum engineering.