

INNOVATION^{°93}

Review

DECODING INNOVATION

◎ AIRBUS BIZLABS
STIMULATE
INTERNAL AND
EXTERNAL
INNOVATION

SURVEY

◎ THE TOP 100
OF INNOVATION

SURVEY

◎ THE MAJOR
PRIVATE SECTOR
GROUPS: THE
FRENCH CHAMPIONS
OF INNOVATION



**NICOLAS
CASTOLDI,**
GENERAL DELEGATE
FOR TECHNOLOGY
VALORISATION
AT THE CNRS

SURVEY **THE FRENCH LEADERS IN PUBLIC RESEARCH**

► BORDEAUX UNIVERSITY (FRANCE)

Photonics & Aeronautics: a wedding with a promising future

Photonics involves cutting-edge uses of lasers, optics, fiber-optics, and electro-optical devices in diverse fields of technology. It is a Key Enabling Technology for a number of sectors, such as aeronautics, space, defense and security. The Cluster LAPHIA (Laser & Photonics in Aquitaine - IdEx) from Bordeaux University gathers a multidisciplinary academic community with 22 research teams of excellence in photonics. Persuaded by the promising connection between photonics & aeronautics, our objective is to initiate and develop partnerships with industrials in the domain - bringing common perspectives and capabilities through expertise and cultural diversity.

THREE SCIENTIFIC HIGHLIGHTS FROM BORDEAUX UNIVERSITY IN LINKED WITH AEROSPACE

1

MULTI MATERIAL FIBERS

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Fiber technology offers a promising alternative for adapting materials to application requirements. This is especially true in the aerospace and avionic sector where flexible, lightweight, electro-magnetic immune devices are actively sought for to provide maximum performances while lowering environmental footprint and energy consumption. Taking full profit of the fertile scientific ecosystem at the University of Bordeaux, Dr. Danto has initiated the implementation of a brand new fiber-drawing technological platform to develop innovative solution for the shaping and functionalization of hybrid fibers. The facility will be surrounded with equipment for preparation of high-purity raw materials, perform assembly and control instrumentation at various stages of the process to ensure reliability and reproducibility. Dr. Danto is confident that development issuing from the platform will lead to a new level of fiber Laser sources and innovative fiber components for manipulating light, with applications spanning communication technology and photonics, health care, dosimeters and other type of real-time sensors and actuators. ■

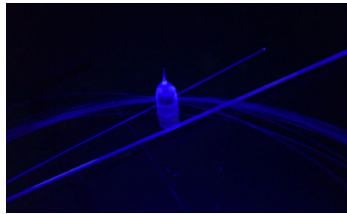


Fig 1: Photosensitive capillaries and fiber.

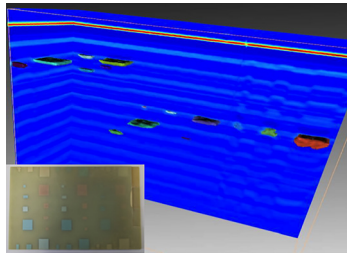


Fig 2: 3D THz imaging of a Glass fiber Solid Laminate: Fiber plies and defects are clearly 3D localized, insert optical picture of the sample.

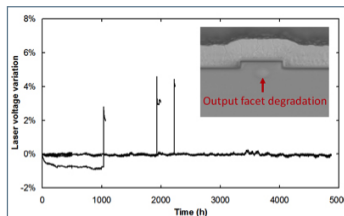


Fig 3: Sudden failures monitoring of pump Laser diode modules during high vacuum life-testing. (Collab. IMS/CNES/AdvEOTec/3SP Technologies/THALES)

2

THz NDT ON AERONAUTICS COMPOSITE MULTI-LAYERED STRUCTURES

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Modern aircraft structures lead to an increased use of composite materials in aeronautics. However, new materials also require new techniques to inspect components during production or maintenance. Terahertz (THz) waves are an innovative technology characterized by safe, contact-free, high resolution, and potentially on-site NDT tool. It allows analysis and defect localization of surface, subsurface and in-depth composite materials. Dr Mounaix believes that the developed NDT tool will fill in the performance gaps that are still present amongst the established NDT techniques. Moreover, the potential of THz applications relies on key factors (1) Transmission through most non-metallic and non-polarized media enabling THz systems to 'see-in depth', (2) THz radiation is non-ionizing with no health risk to the system's operator. The results within a FP7 project on air transport NDT (DOTNAC) demonstrated that THz waves is efficient for material defects detection such as delamination, fractures, inclusions and thickness measurements down to few dozens of microns. Any industry (civilian and military) that fabricates and/or maintains composite structures can benefit both in terms of cost savings and part integrity. ■

3

PHYSICS OF FAILURE AND RELIABILITY ASSESSMENT OF PHOTONIC DEVICES AND SYSTEMS

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Photonic systems are more and more used for aerospace applications and most of these systems require reliable optoelectronic emitters or photodetectors such as Laser diodes or phototransistors. Examples of satellite applications including such devices consist in time reference (atomic clock), attitude control (Fiber Optic Gyroscope) and telecommunications (inter-satellite links and satellite-downlinks). IMS Lab has developed a large experience and is now recognized as an international leader in this field through many studies in collaboration with academic and industrial partners. The works focus on the understanding of physics of failure mixing analytical/FEM modeling of optoelectronic devices degradation in severe environments and experimental characterizations through a dedicated platform able to measure a wide range of electro-optical parameters with ultra-high accuracy. This platform has been recently supported by the Région Aquitaine Council. Such studies will necessarily bring a significant part and an added value to the Design for Reliability (DfR) of future photonic systems in aerospace ■

► "SAVE THE DATE":

The interregional competitiveness AEROSPACE VALLEY and ROUTE DES LASERS clusters have created recently a new zone for strategic activities named "PHAROS" to develop photonics applications for the aeronautics and space industries >>>

1st conference with scientists & industrials planned on **October 24-26, 2016**

@ Institut d'Optique d'Aquitaine in Talence
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