

# ICFO<sup>R</sup> CORPORATE LIAISON DAY

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2011 FOCUS THEME  
**LIGHT FOR SENSING**

**FRIDAY OCTOBER 14, 2011**

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Please complete the [registration form](#) and send it to [clp@icfo.eu](mailto:clp@icfo.eu) before September 30, 2011

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## 2011 FOCUS THEME LIGHT FOR SENSING

FRIDAY OCTOBER 14, 2011

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- 09:00 · 09:30 **Registration and Welcome Coffee**
- 09:30 · 09:45 **Welcome Address**
- 09:45 · 10:30 **Light-based Gas Sensing in Agriculture**  
Frans J. M. Harren  
Radboud University. Nijmegen, the Netherlands
- 10:30 · 11:15 **Light-based Sensing for Life Sciences:  
Lab on a Chip Diagnosis**  
Romain Quidant  
ICFO. Barcelona, Spain
- 11:15 · 11:30 **Coffee Break**
- 11:30 · 12:15 **Optical Fiber Sensors:  
Applications, Challenges and Opportunities**  
Alexis Méndez  
MCH Engineering LLC. Alameda, CA., USA
- 12:15 · 13:00 **High temperature Fiber Seismic Sensor**  
Anton Zavriyev  
MagiQ. Boston, MA., USA
- 13:00 · 13:15 **2011 ICFO PhD Thesis Award**
- 13:15 · 14:00 **Networking Lunch**
- 14:00 · 15:00 **ICFO Annual Poster Session**  
[Coffee served]
- 15:00 · 18:00 **Project Meetings (by invitation)**



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## FRANS J. M. HARREN

Radboud University.  
Nijmegen, the Netherlands

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### Light-based Gas Sensing in Agriculture

Over recent years, continuously tunable, quantum cascade lasers and Optical Parametric Oscillators (OPOs) have been developed for the mid-infrared wavelength region. Such lasers provide continuous wave high laser power in the infrared wavelength region. Accurate, interference free detection of gases come into reach for gases such as ethylene, nitric oxide, water, carbon dioxide, ethane and methane. These molecules possess fingerprint-like absorption spectra in this wavelength region. When the lasers are combined with sensitive spectroscopic techniques extreme sensitivities can be reached to trace these gases under atmospheric conditions. This has made lasers applicable for a wide variety of applications in biology and agriculture; detection of volatile metabolites can give valuable information on processes inside biological tissue. Examples will be given for the important plant hormone ethylene, which is responsible for many developmental stages in plants, flowers and fruit. Via the detection of ethanol, fermenting stages of fruits can be assessed during storage and transport. Oxidative stress and pathogenic attack in plants and fruit was studied during chilling stress (cucumber leaves), submergence (rice seedlings) and bacterial infection (tobacco leaves and tomatoes). Respiration of insect could be followed by recording (at  $4.32 \mu\text{m}$ ) the exhaled  $\text{CO}_2$  patterns in real-time from single ants and fruit flies.



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## ROMAIN QUIDANT

ICFO.  
Barcelona, Spain

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### Light-based Sensing for Life Sciences: Towards an Integrated Diagnosis Platform

Noble metal nanostructures support localized surface plasmon (LSP) resonances that are associated with an enhanced light scattering in both the far field and the near field regions. Recent advances in both colloidal synthesis and top-down nanofabrication techniques have enabled controlling with a high degree of accuracy plasmon fields and engineering plasmonic nanostructures for a wide range of applications.

In this presentation we discuss the use of gold nanoparticles for healthcare, focusing on early diagnosis and treatment follow-up of cancer. We present our latest advances in the development of an integrated analytical platform that aims at detecting low concentrations of cancer markers both circulating in blood and over-expressed at the surface of cancer cells.



**ALEXIS MÉNDEZ**  
MCH Engineering LLC.  
Alameda, CA., USA

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## **Optical Fiber Sensors: Applications, Challenges and Opportunities**

Over the past decade, optical fiber sensors have seen increased acceptance and widespread use in different fields and industries for a variety of applications ranging from structural sensing and health monitoring of materials and structures; to downhole pressure and temperature sensors for oil and gas reservoir monitoring; to high voltage and high current sensing systems for the power industry; to biomedical intra-aortic devices—to name just a few.

Optical fiber sensor operation and instrumentation have become well understood and developed, and a broad variety of commercial discrete sensors and instruments—based on Fabry-Perot (FP) cavities and fiber Bragg gratings (FBGs), as well as distributed ones based on Raman and Brillouin scattering methods—are nowadays readily available. However, some technical hurdles and market barriers remain that need to be overcome in order for fiber sensing technology—as well as other photonic sensing technologies—to gain more commercial momentum and achieve faster and broader market growth compared to conventional sensing technologies.

This talk will provide an overview on fiber sensing technology's milestones in the civil structure, defense, oil & gas, biomedical and other segments, along with its associated commercial status, future prospects and market outlook. The main goal is to contrast the issues and progress made on the R&D side against the trends on the industrial and commercial fronts.



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**ANTON ZAVRIYEV**  
MagiQ.  
Boston, MA., USA

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## **High Temperature Fiber-based Seismic Sensor, or How Else Can One Use a QKD System**

Enhanced geothermal systems require seismic sensors for accurate mapping of the rock fractures before and after stimulation. Currently available sensors are electronics-based and can not operate in the downhole environment where the temperature may reach well over 250°C. To address this problem MagiQ Technologies is developing a sensor system that will use the state-of-the-art path-matched differential interferometry technique to precisely monitor remote seismic excitations. All signal processing electronics as well as all the optical sources and detectors will be located at the surface, and only a passive opto-mechanical sensing head will be exposed to the harsh downhole environment.

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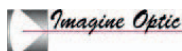
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